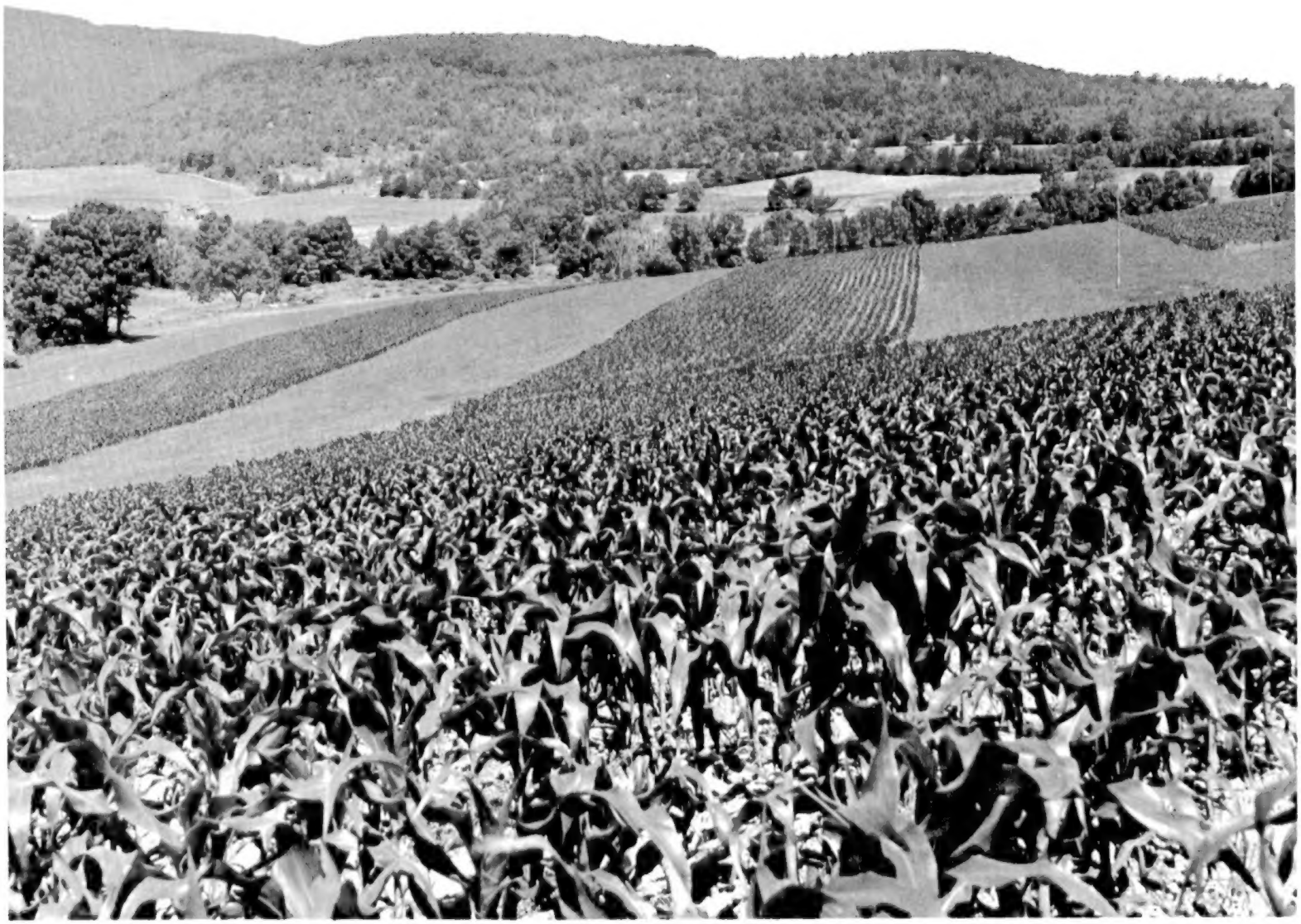
SOIL SURVEY OF

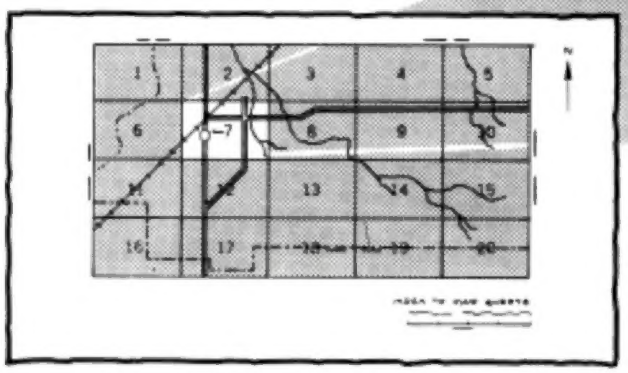
LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA

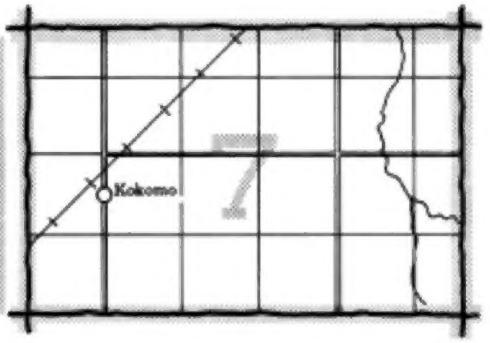


United States Department of Agriculture, Soil Conservation Service,
in cooperation with Pennsylvania State University, College of Agriculture, and
Pennsylvania Department of Environmental Resources, State Conservation Commission

HOW TO USE

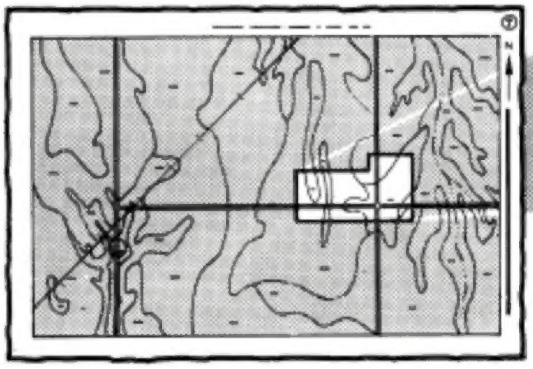
1. Locate your area of interest on the "Index to Map Sheets"

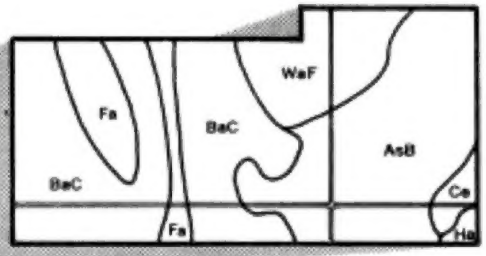




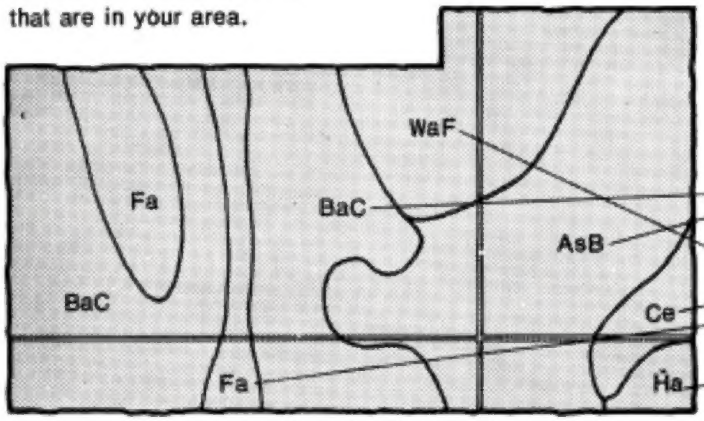
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.

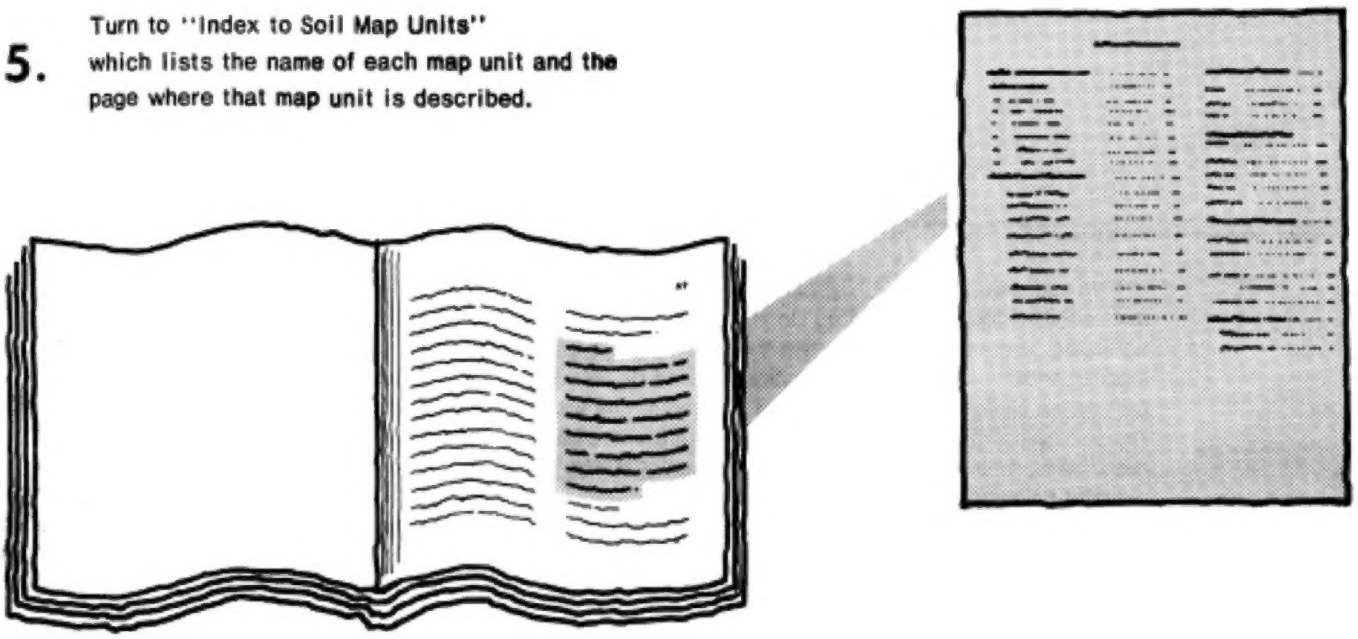


Symbols

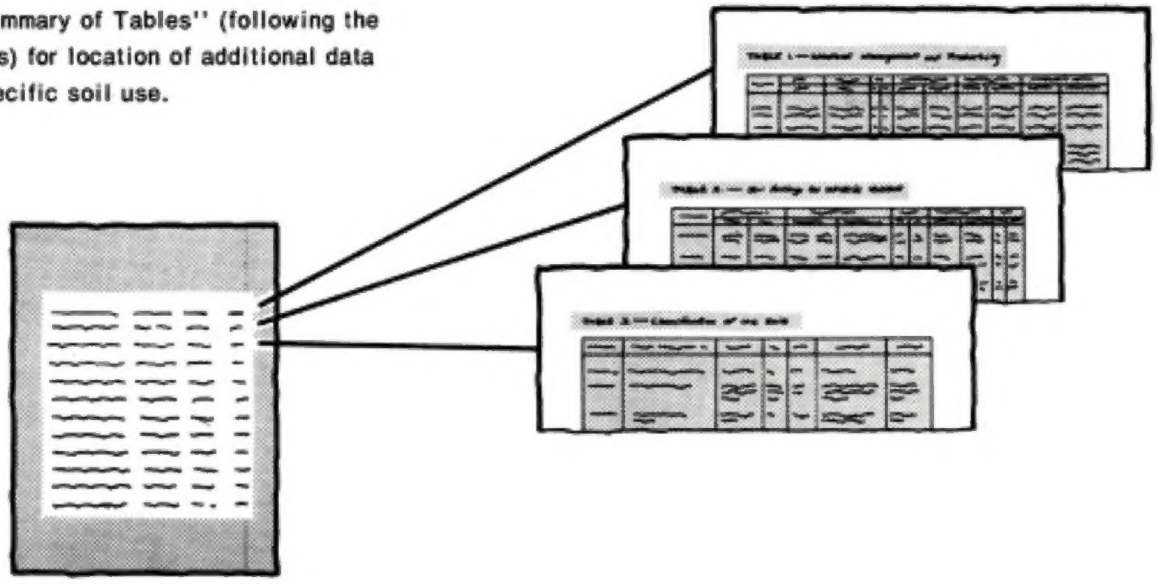
AsB
BaC
Ce
Fa
Ha
WaF

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1967-75. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service and the Pennsylvania State University, College of Agriculture, and the Pennsylvania Department of Environmental Resources, State Conservation Commission. It is part of the technical assistance furnished to the Lackawanna County Conservation District and the Wyoming County Conservation District. Financial assistance was provided by the Boards of Commissioners of Lackawanna and Wyoming Counties and by the Department of Housing and Urban Development, under provisions of section 701 of the Housing Act of 1954 as amended.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Stripcropping reduces erosion and runoff on Wellsboro channery loam, 3 to 8 percent slopes.

Contents

Issued March 1982

Index to soil mapping units

Index to soil mapping units—Continued

Summary of tables

Summary of tables—Continued

Foreword

The Soil Survey of Lackawanna and Wyoming Counties contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

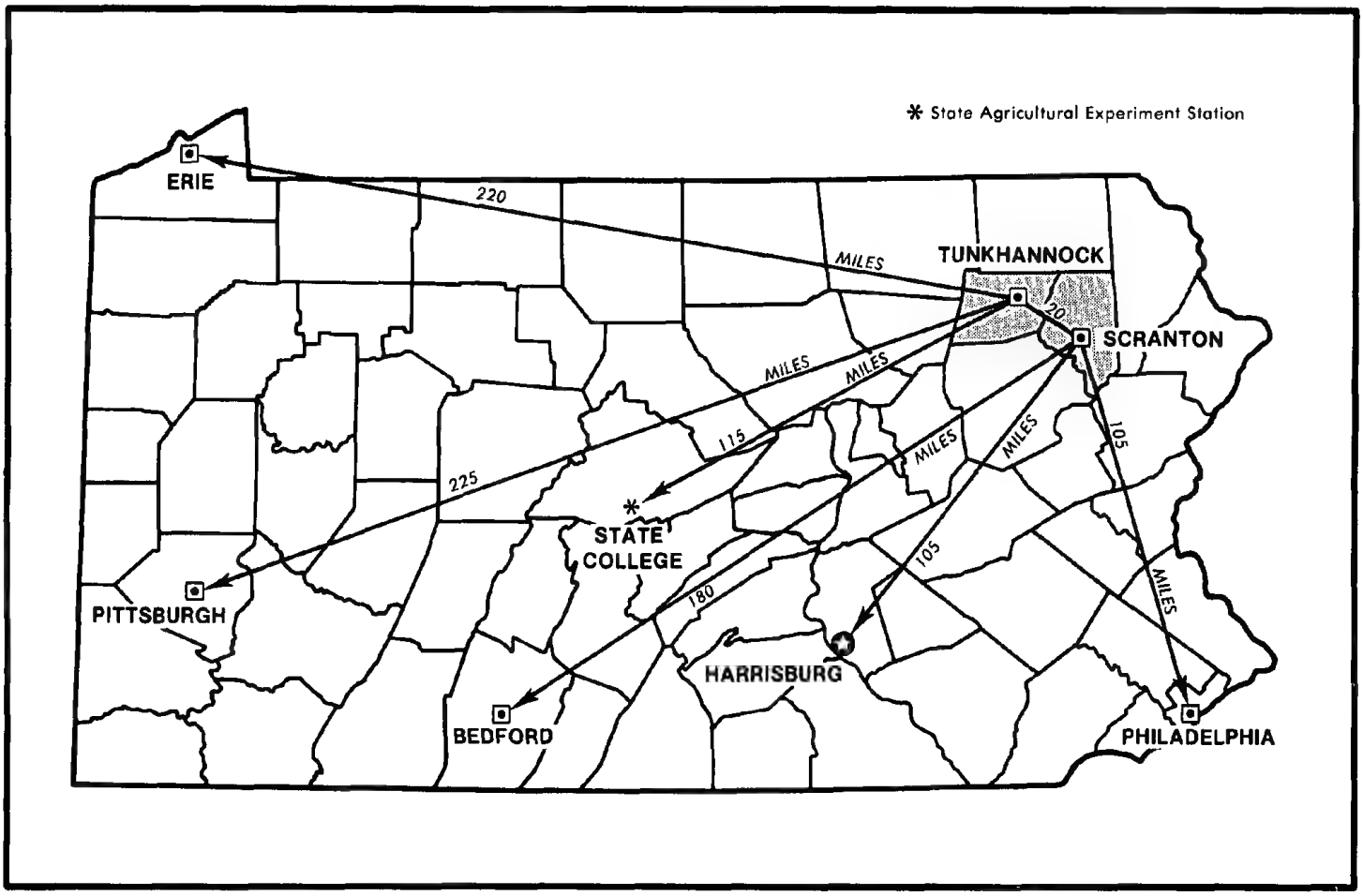
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Graham T. Munkittrick
State Conservationist
Soil Conservation Service



Location of Lackawanna and Wyoming Counties in Pennsylvania.

SOIL SURVEY OF LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA

By Joseph J. Eckenrode, Soil Conservation Service

Fieldwork by Joseph J. Eckenrode, Donald B. Holzer, Edward H. Sautter, and Samuel A. Browning, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with Pennsylvania State University, College of Agriculture, and Pennsylvania Department of Environmental Resources, State Conservation Commission

LACKAWANNA and WYOMING COUNTIES are in the northeastern part of Pennsylvania.

Lackawanna County has a total area of 454 square miles or 290,560 acres. Wyoming County has a total of 396 square miles or 253,440 acres. Census data in 1976 showed a population of 232,600 in Lackawanna County and 19,000 in Wyoming County.

The counties are less than 200 miles from such large metropolitan areas as New York, Philadelphia, and Baltimore. Interstate 81, along with I-80 and I-84, allows millions of people to be within several hours driving time of the two counties.

Lackawanna and Wyoming Counties have many natural, historic, and manmade tourist attractions. Scenic mountains, waterfalls, fishing streams, lakes, camping areas, and many other recreational facilities are available.

The entire survey area has been glaciated. As a result of the glaciation many of the soils are too stony or too wet for cultivated crops. Nearly 60 percent of the survey area is used for woodland, and the acreage trend for this use is increasing. Approximately 33 percent of the survey area is used for farmland. Dairy farming is the most important type of farming (*7*). Poultry and vegetables are also important. Most of the farms are in the northern and western parts of Lackawanna County and in the northern and eastern parts of Wyoming County. Many of the areas farmed in the past are presently idle or reverting to trees. Numerous farms have been purchased for second homes and recreational uses.

Controlling soil erosion, increasing low available water capacity in rapidly permeable soils, and improving the drainage in wet soils are major concerns in managing areas that are presently being farmed. In areas that are developed for homesites and recreational uses, the major concerns in management are wetness, slow permeability, and shallow depth to bedrock. If these limitations are not overcome, dwellings and other buildings constructed in these areas are likely to have wet basements and malfunctioning sewage systems.

The number of recreational facilities in the survey area have been increasing. Ski slopes, snowmobile trails, lakes, rivers, golf courses, and large areas of public hunting land make the area a tourist attraction throughout the year.

General nature of the counties

This section provides general information about Lackawanna and Wyoming Counties. It discusses geology, water, climate, and farming.

Geology

Joseph N. Van, geologist, Soil Conservation Service, helped prepare this section and the section on "Water."

Wyoming and Lackawanna Counties are in two physiographic provinces (*5*). The approximate middle third of Lackawanna County is in the Appalachian Mountain section of the Valley and Ridge province. This Valley and Ridge section, known as the Anthracite Coal Region, averages about 6 miles in width and trends in a southwest-northeast direction. The remainder of Wyoming and Lackawanna Counties lies in the Appalachian Plateaus province.

Most bedrock underlying the Appalachian Plateaus province in the survey area consists chiefly of red to brownish shale and sandstone of the Catskill Formation, which is upper Devonian in age (*6*). Lower Devonian bedrock of the Chemung Formation underlies a small part of the northwestern corner of Wyoming County and consists of fossiliferous gray sandy shale and sandstone. The southwestern quarter of Wyoming County is underlain by Mauch Chunk shale and Pocono sandstone, which are Mississippian in age, and a small part is under-

lain by younger beds of Pottsville sandstone, which is Pennsylvanian.

The Appalachian Mountain section of the Valley and Ridge province is known as the Wyoming-Lackawanna Valley, and is a long synclinal trough with the outer rim made up of a very hard resistant sandstone and conglomerate of the Pocono Formation. The inner rim is made up of bedrock of the Pottsville Formation. Between the two rims is a thin section of soft Mauch Chunk shale. The inner synclinal trough contains folded and faulted beds of post-Pottsville shale, sandstone, and some conglomerate and several mineable anthracite coal layers. Several minor anticlines and synclines are in the Plateaus province in the remaining part of Wyoming and Lackawanna Counties.

During the Pleistocene Epoch, a series of great continental ice sheets advanced and retreated, covering Wyoming and Lackawanna Counties with accumulations of glacial debris of sand, rounded gravels, and boulders from melt water. Other material that was deposited directly from the ice with little or no sorting or stratification is distributed unevenly throughout the region and is classified as glacial till. This till is as much as 300 feet deep in some places, and the present topography is the result of erosion of this glacial drift.

Water

The Wisconsin glacier was the last of the great ice sheets and is responsible for the deposition of thick glacial terraces along the Susquehanna River and its tributaries. In low areas where terraces of glacial outwash are present, many springs provide good quality of water as do the wells that are dug in the glacial drift. Also, the areas of outwash terraces are good sources for commercial sand and gravel.

Most domestic water supplies are obtained from drilled wells in the continental Catskill sandstones where the porosity is derived from fractures and joints and between the bedding planes of the rock (*8*). Yields of water from drilled wells in the bedrock of the Pottsville, Pocono, and Chemung Formations are not as high as those from the Catskill, and the quality of water is not as good as that from the wells from the Catskill.

In low areas of the Wyoming-Lackawanna Valley, springs with high yields and good quality of water were once numerous; however, the water was contaminated in mining of anthracite coal. Afterwards the spring water was only used for washing the coal.

Climate

Climatic data in this section were especially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

Lackawanna and Wyoming Counties are in the northeastern part of Pennsylvania. Elevation ranges from 680 feet along the Lackawanna River to 2,369 feet in the Moosic Mountains near the eastern border of Lackawanna County. Local relief is generally 100 to several hundred feet. The area is not rugged enough for a true mountain climate, but it has many of the characteristics of such a climate. The following information is based on data from Scranton, Pennsylvania for the period 1941-70, unless otherwise stated.

Summer, generally the most pleasant time of year, has warm days and cool nights. About 60 percent of possible sunshine is received during summer. The average daily maximum temperatures are generally in the low eighties, while nighttime daily minimum temperatures average in the high fifties. Maximum temperatures of 90 degrees F occur about 15 to 20 days a year during June, July, and August. During summer an average of at least one week with hot and humid conditions prevails, and maximum temperatures rise into the nineties daily; however, nights generally remain comfortable as air that is cooled by radiation at higher elevations flows into the valleys. A maximum temperature of 100 degrees or higher has been recorded twice during the past 30 years. The absolute maximum recorded, 101 degrees, occurred July 4, 1966. The annual precipitation for the area, as shown in table 1, is approximately 37 inches. Months late in spring and in summer receive more precipitation than the other months. An average of seven thunderstorms occurs during each of the summer months. Heavy rainfall associated with hurricanes or tropical storms moving up the east coast are occasional and result in flooding of the lower areas. The average noon relative humidity at the Avoca Wilkes-Barre Airport during the summer is about 55 percent. The prevailing wind is southwest at 7 miles per hour.

Winter is cold and cloudy with daytime daily maximum temperatures in the mid-thirties and nighttime daily minimum temperatures in the high teens to the low twenties. Winter daily minimum can be expected to be 32 degrees or below about 7 days out of 10. From mid-December to early in March, minimum temperatures of 0 degrees or below are recorded on 6 or more days. The extreme low recorded during the past 30 years, -13 degrees, occurred February 15, 1943. Winter precipitation, which is light but frequent, is received as rain or snow. The annual snowfall for the area is about 40 inches but may vary widely in a short distance. The annual total number of days with snow cover of 1 inch or more is 50. The average noon relative humidity for the Avoca Wilkes-Barre Airport is 60 percent. The prevailing wind direction in winter is southwest with an average speed of 9 miles per hour.

Alternate periods of freezing and thawing occur frequently in spring and fall. Sunshine becomes more prevalent during spring with temperatures rising, while autumn sunshine provides many mild days and cool nights through much of October. The average dates for the last freeze in spring and the first in fall, as shown in

table 2, are April 24 and October 14, respectively. This gives Scranton an average growing season of 173 days.

Farming

In the past few years, the number of farms and the total acres in farms in the survey area have decreased, but the average size of the farms has increased. Each year more farmland is converted to residential use, and the need for farmland is becoming more critical.

In 1974, about 950 farms were in the survey area. About 80 percent of these was cattle or dairy farms. The remaining 20 percent was hog, sheep, and chicken farms. The principal crops for the survey area had the following yields: corn for grain in Lackawanna County, 81,000 bushels and in Wyoming County, 487,000 bushels; corn for silage in Lackawanna County, 20,200 tons and in Wyoming County, 37,100 tons; hay in Lackawanna County, 44,900 tons and in Wyoming County, 41,100 tons; and wheat in Lackawanna County, 1,500 bushels and in Wyoming County, 2,000 bushels.

Farming is economically important in the survey area, and it will continue to be important as long as good farmland is available.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each association is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in other associations but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one association differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

1. Wellsboro-Morris-Oquaga association

Nearly level to steep, deep and moderately deep soils that are moderately well drained, somewhat poorly drained, and somewhat excessively drained; on uplands

This is the largest association in the survey area, and it makes up about 42 percent of the area. It consists of soils on broad rolling uplands. The soils formed in glacial till derived from sandstone and shale (figs. 1 and 2).

Wellsboro soils are dominant in this association and make up about 25 percent. They are deep, moderately well drained soils on knolls and side slopes of ridges. Wellsboro soils have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Morris soils make up about 20 percent of the association. They are deep, somewhat poorly drained soils in depressions and slightly concave positions on the landscape. Morris soils have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Oquaga soils make up about 20 percent of the association. They are moderately deep, somewhat excessively drained soils on ridgetops and steep side slopes of ridges and valleys. Oquaga soils have bedrock at a depth of 20 to 40 inches.

Soils of minor extent make up the remaining 35 percent of the association. They are the Lackawanna soils on knolls, the Norwich and Chippewa soils in depressions and swamps, and the Arnot soils on ridgetops.

Dairy farming is the principal land use in this association. Some areas are used for truck farming. Areas near small towns and along main roads are being used increasingly for building sites and other urban uses. A seasonal high water table, depth to bedrock, restricted permeability, and stoniness are major limitations of the soils in this association.

2. Mardin-Lordstown-Volusia association

Nearly level to moderately steep, deep and moderately deep soils that are moderately well drained, well drained, and somewhat poorly drained; on uplands

This association makes up about 10 percent of the area. It consists of soils on rolling uplands. The soils formed in glacial till (figs. 3 and 4).

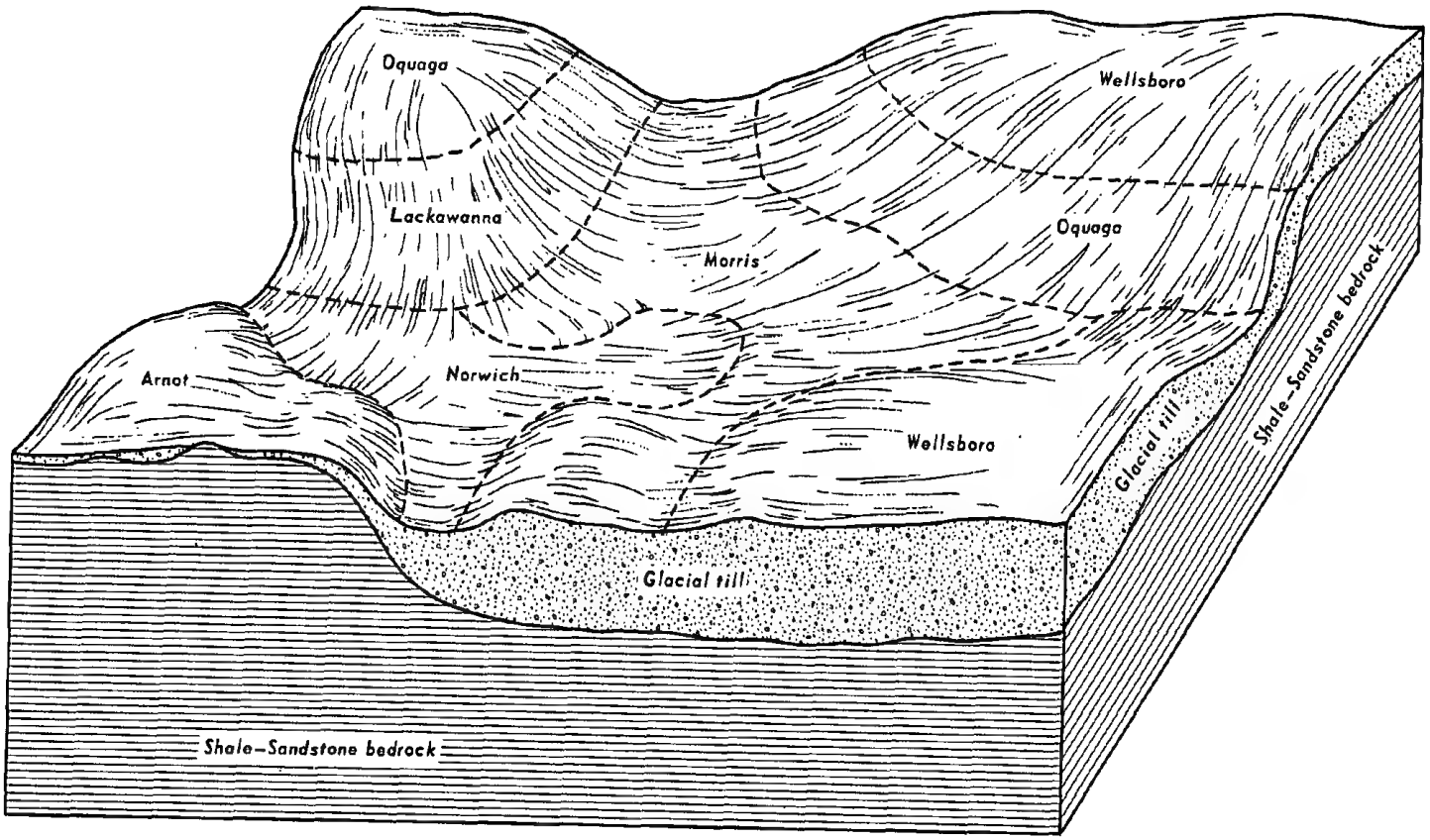


Figure 1.—Typical pattern of soils and underlying material in the Wellsboro-Morris-Oquaga association.

Figure 2.—Typical landscape of the Wellsboro-Morris-Oquaga association. Gently sloping Wellsboro soils are in area planted to corn, Morris soils are in the foreground, and sloping Oquaga soils are in pasture in the background.

Figure 3.—Pasture in the Mardin-Lordstown-Volusia association. Mardin soils are in the foreground, Volusia soils are in the center, and sloping Lordstown soils are in the background.

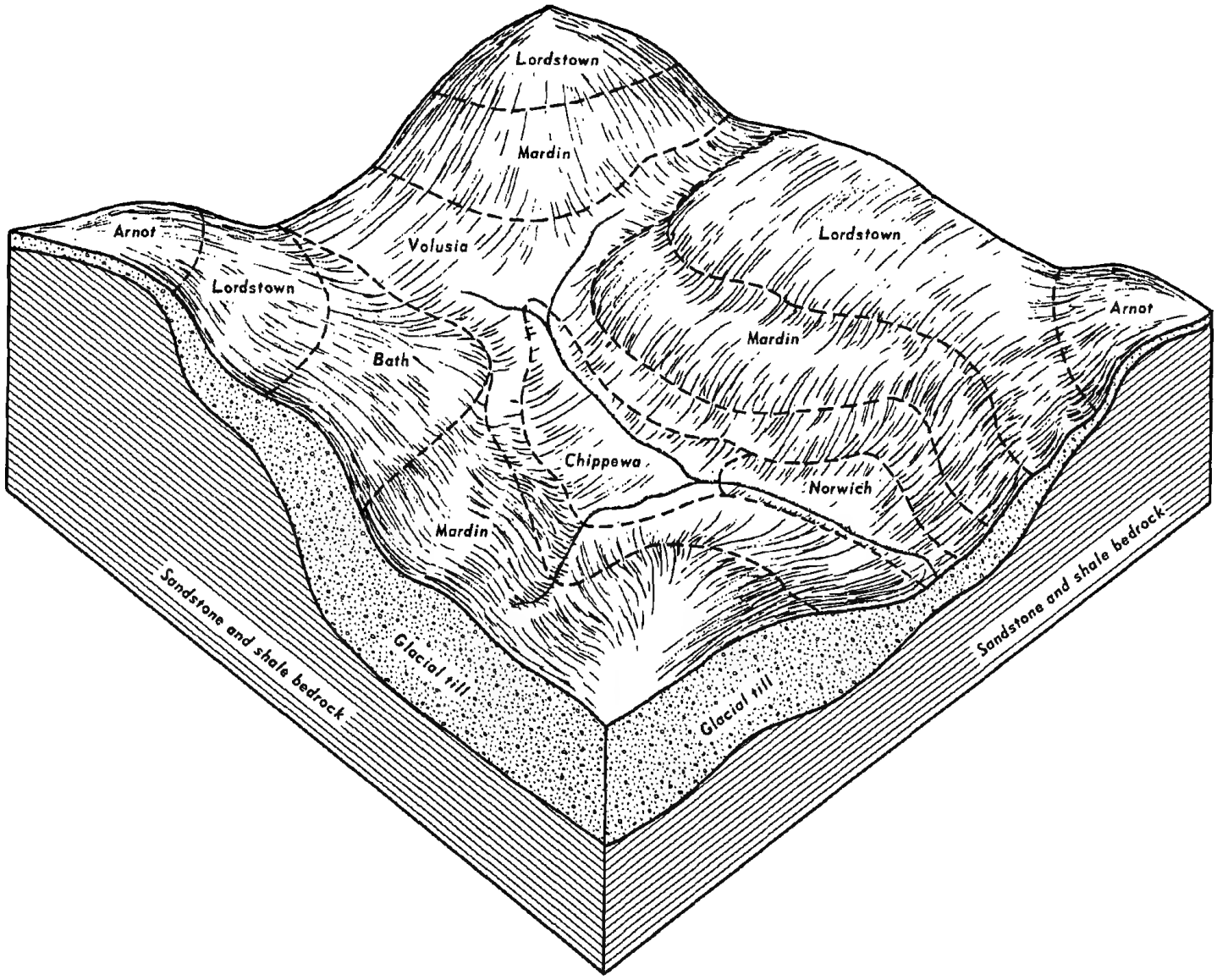


Figure 4.—Typical pattern of soils and underlying material in the Mardin-Lordstown-Volusia association.

Mardin soils are dominant in this association and make up about 25 percent. They are deep, moderately well drained soils on slightly convex knolls and side slopes of ridges. Mardin soils have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Lordstown soils make up about 20 percent of the association. They are moderately deep, well drained soils on higher convex ridgetops and side slopes of ridges. Lordstown soils have bedrock at a depth of 20 to 40 inches.

Volusia soils make up about 20 percent of the association. They are deep, somewhat poorly drained soils in depressions and on slightly concave positions on the landscape. Volusia soils have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Soils of minor extent make up the remaining 35 percent of the association. They are the Norwich and Chippewa soils in concave and swampy areas, the Arnot soils on ridgetops, and the Bath soils on convex knolls and side slopes.

Dairy farming is the principal land use in this association. Some areas are used for truck farming. Areas near small towns and along main roads are being used increasingly for building sites and other urban uses. Much of the acreage of this association is left wooded because the soils have so many limitations. Stoniness, steep slopes, restricted permeability, depth to bedrock, and a seasonal high water table are major limitations of the soils in this association.

3. Oquaga-Lackawanna-Arnot association

Moderately steep and steep, moderately deep, deep, and shallow soils that are somewhat excessively drained and well drained; on mountainsides

This association makes up about 10 percent of the area. It consists of soils on mountainsides in the southwestern part of Wyoming County. The soils formed in glacial till derived from sandstone and shale (figs. 5 and 6).

Oquaga soils are dominant in this association and make up about 30 percent. They are moderately deep, somewhat excessively drained soils in the center of the mountainsides. Oquaga soils have bedrock at a depth of 20 to 40 inches.

Lackawanna soils make up about 25 percent of the association. They are on the lower part of the mountainsides. They are deep, well drained soils but have a slowly permeable fragipan.

Arnot soils make up about 15 percent of the association. They are shallow, somewhat excessively drained, and generally occur on the upper part of steep mountainsides. Bedrock is at a depth of 10 to 20 inches.

Soils of minor extent make up about 30 percent of the association. They are Dystrochrepts and Rock outcrop on the steepest parts of mountainsides, the Wellsboro soils on moderately steep lower slopes of the mountainsides, Fluvents and Fluvaquents in narrow drainageways, and the Pope and Wyoming soils on wider flood plains and terraces.

Woodland is the principal land use in this association. Steepness of slope, depth to bedrock, and stoniness are major limitations of the soils in this association.

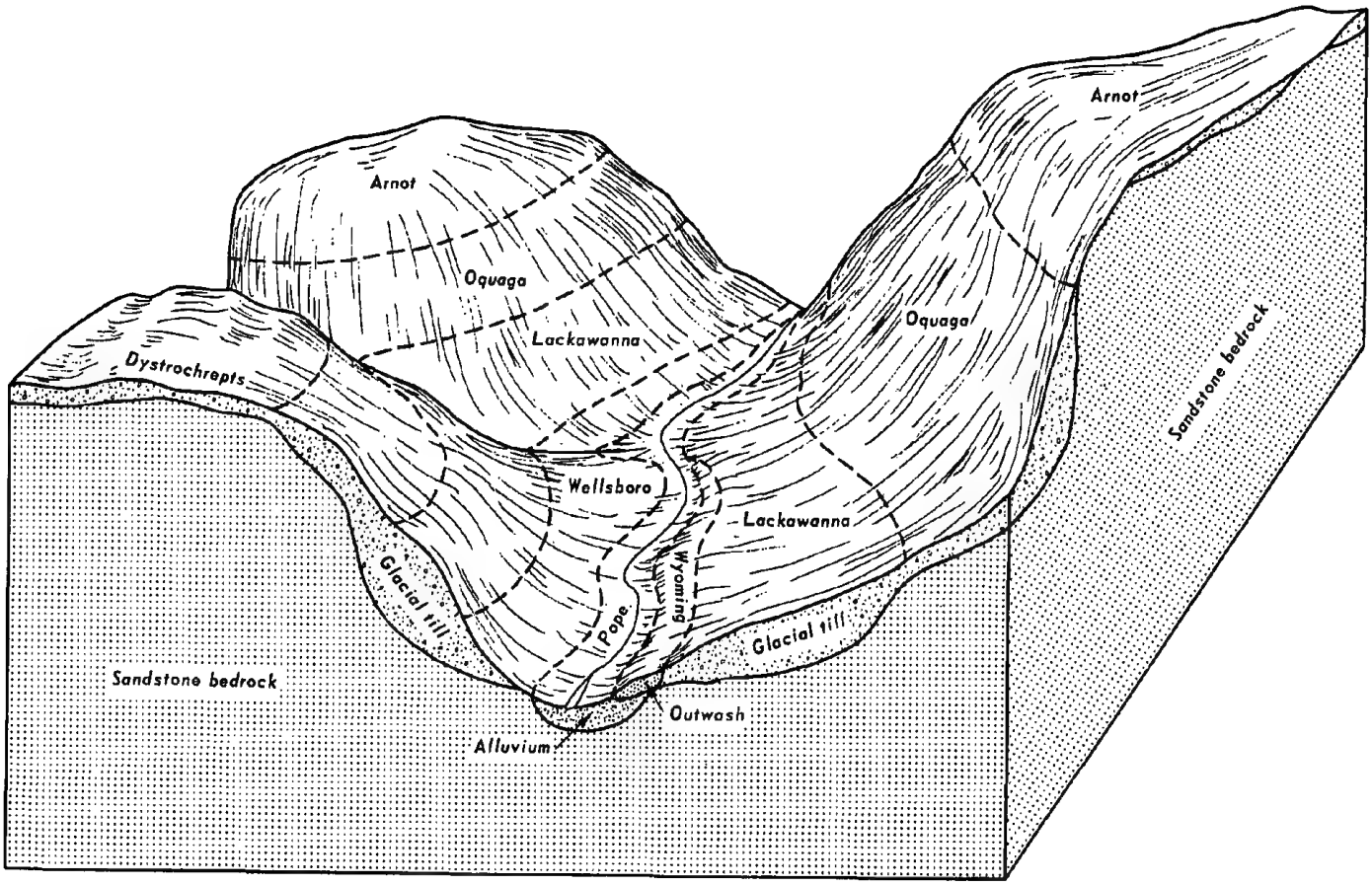


Figure 5.—Typical pattern of soils and underlying material in the Oquaga-Lackawanna-Arnot association.

Figure 6.—Typical landscape of the Oquaga-Lackawanna-Arnot association. Lackawanna soils are in the foreground, Oquaga soils are in the center, and Arnot soils are in the background.

4. Mardin-Bath-Volusia association

Nearly level to steep, deep soils that are moderately well drained, well drained, and somewhat poorly drained; on uplands

This association makes up about 8 percent of the area. It consists of soils on rolling uplands. The soils formed in glacial till (fig. 7).

Mardin soils are dominant in this association and make up about 30 percent. They are deep, moderately well drained soils on slightly convex knolls and side slopes of ridges. Mardin soils have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Bath soils make up about 25 percent of the association. They are on higher convex knolls and steep side slopes of ridges and drainageways. They are deep, well drained soils and have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Volusia soils make up about 20 percent of the association. They are in depressions and on slightly concave positions on the landscape. They are deep, somewhat poorly drained soils and have a slowly permeable fragipan that impedes root growth and water movement through the soil.

Soils of minor extent make up the remaining 25 percent of the association. They are the Norwich and Chippewa soils in concave and swampy areas and the Lordstown and Arnot soils on ridgetops and steep side slopes.

Dairy farming is the principal land use in this association. Some areas are used for truck farming. Areas near small towns and along main roads are being used increasingly for building sites and other urban uses. Much of the acreage of this association is left wooded because the soils have so many limitations. A seasonal high water table, restricted permeability, stoniness, and steep slopes are major limitations of the soils in this association.

5. Wyoming-Pope association

Nearly level to steep, deep soils that are somewhat excessively drained and well drained; on terraces and flood plains

This association makes up about 6 percent of the area. It consists of gravelly sandy loam soils on stream

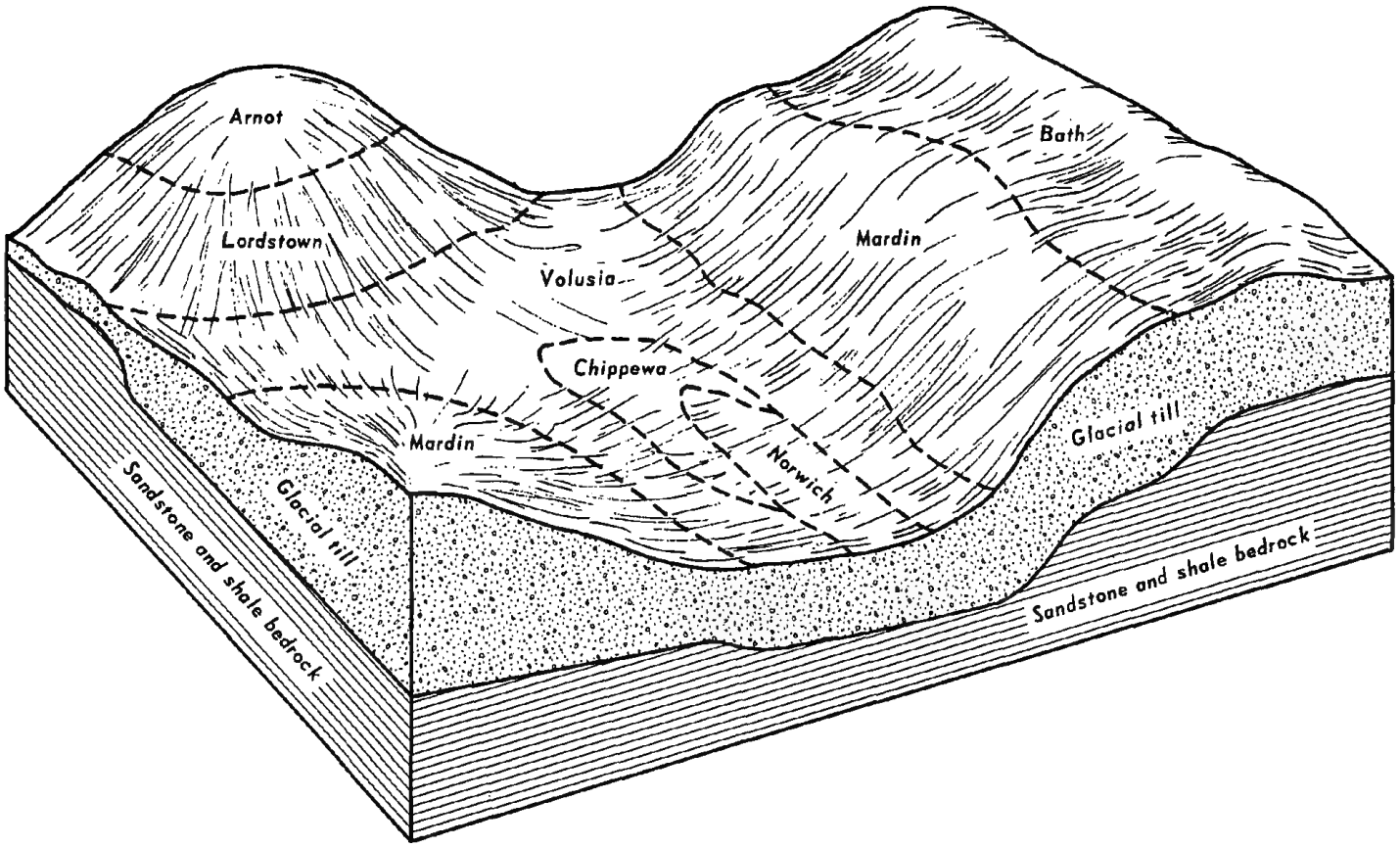


Figure 7.—Typical pattern of soils and underlying material in the Mardin-Bath-Volusia association.

terraces and loamy soils on flood plains (figs. 8 and 9). The largest areas of this association are along the Susquehanna River and its tributaries in Wyoming County.

Wyoming soils are dominant in this association and make up about 50 percent. They are deep, somewhat excessively drained, gravelly soils on terraces above present flood plains.

Pope soils make up about 15 percent of the association. They are deep, well drained, alluvial soils on flood plains.

Soils of minor extent make up the remaining 35 percent of the association. They are the Unadilla, Braceville, and Atherton soils on terraces; and the Holly soils, Fluvents, and Fluvaquents on flood plains.

Dairy farming is a major enterprise in this association. However, much of the acreage on the flood plains is used for truck farming. The sand and gravel industry is important in the areas of Wyoming soils. Some areas are used for building sites and other urban uses. Flooding, low available water capacity, and the hazard of ground water contamination are major limitations of the soils in this association.

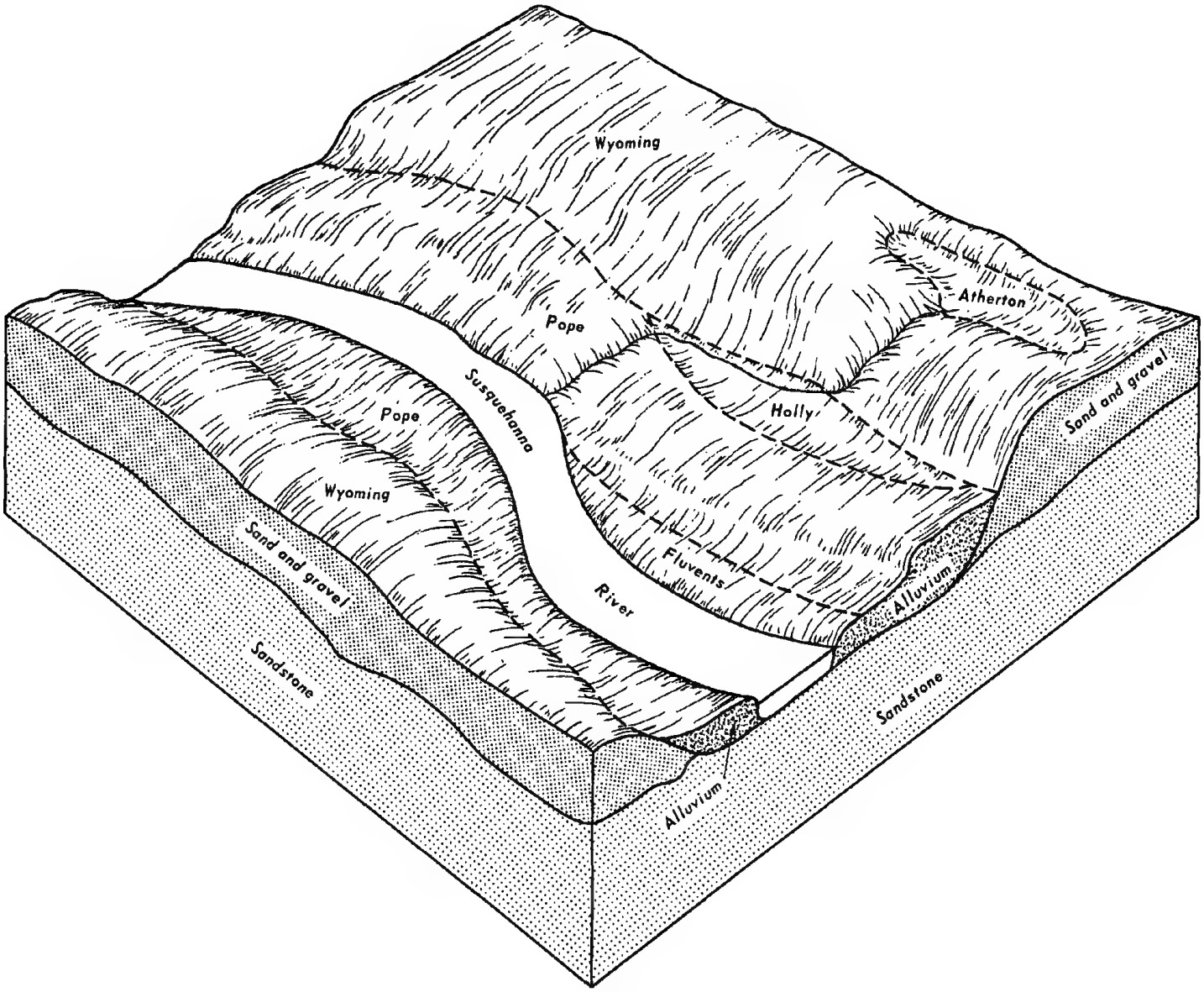


Figure 8.—Typical pattern of soils and underlying material in the Wyoming-Pope association.

Figure 9.—Typical landscape of the Wyoming-Pope association. Sloping Wyoming soils are in the background, to the right, and in the center. Level Pope soils are in the foreground and in the center.

6. Rock outcrop-Arnot-Dystrochrepts association

Rock outcrop and nearly level to steep, shallow to deep, nonstony and extremely stony soils that are well drained and somewhat excessively drained; on mountaintops and mountainsides

This association makes up about 14 percent of the area. It consists mainly of areas on mountaintops and steep mountainsides. The areas have little or no soil material or have shallow soils.

Rock outcrop makes up about 20 percent of the association. It generally consists of light gray to white conglomerate and greenish or gray sandstone. Rock outcrop occupies the mountaintops and bedrock escarpments along mountainsides.

Arnot soils make up about 20 percent of this association. They are shallow, somewhat excessively drained soils on mountaintops and mountainsides.

Dystrochrepts make up about 10 percent of the association. They are shallow to deep, extremely stony, well drained and somewhat excessively drained soils.

Soils of minor extent make up the remaining 50 percent. They are the Lordstown, Oquaga, and Swartswood soils on knolls and the Volusia and Chippewa soils in depressions.

About half of this association has little or no vegetation; the other half consists of woodland and scrub vegetation. The lack of soil material, depth to bedrock, stoniness, and steep slopes are major limitations of the soils in this association.

7. Udorthents-Mine dumps association

Nearly level to steep, deep to shallow, well drained to poorly drained soils in areas that have been strip mined, and Mine dumps; on uplands

This association makes up about 6 percent of the area. It consists of soil, rock material, and areas of exposed bedrock that have been disturbed during coal mining operations.

Udorthents are dominant in this association and make up about 35 percent of the area. They consist generally of the excavated areas and the stockpiled areas of disturbed soil material from glacial till. They are somewhat poorly drained to well drained.

Mine dumps make up 15 percent of the association. The dump material is generally dark and highly carbonaceous and was discarded during the coal processing. Coarse fragment content is high, and there is little or no soil material.

Soils of minor extent and Rock outcrop make up the remaining 50 percent. They are the Arnot, Swartswood, Wurtsboro, Wellsboro, Morris, Lordstown, and Oquaga soils and Rock outcrop in undisturbed areas.

Most areas of this association are idle. Small areas are being reclaimed and used for building sites and fill material, and some areas are being used for landfill sites. Erosion, steep slopes, coarse fragments, depth to bedrock, and the seasonal high water table are major limitations of the soils of this association.

8. Urban land association

Nearly level to moderately steep, deep to shallow soils that are well drained to somewhat poorly drained; in residential and industrial areas on uplands

This association makes up about 4 percent of the area. It consists of areas in Scranton and in other communities where urban structures cover more than 85 percent of the soils. Generally, all soils have also been disturbed or altered.

Urban land makes up about 65 percent of the association. The soils in these areas are quite variable and require onsite investigation to determine specific properties and limitations.

Soils of minor extent make up the remaining 35 percent. They are Urban land, occasionally flooded, along streams; Udorthents, Mine dumps, and the Wellsboro, Morris, and Oquaga soils on uplands; and the Pope soils on flood plains.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

This survey has both narrowly defined and broadly defined units. Broadly defined units are more variable in composition than other units but can be interpreted for the expected uses of the soils. They are indicated by symbols in which all letters are capitals. They are also indicated by a footnote on the soil legend at the back of this publication.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a similar profile make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Wellsboro channery loam, 3 to 8 percent slopes, is one of several phases within the Wellsboro series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them.

Lackawanna and Bath extremely stony loams, steep, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Urban land is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 3, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

ArC—Arnot very channery silt loam, very rocky, 3 to 15 percent slopes. This gently sloping to sloping, somewhat excessively drained soil is on ridgetops and mountaintops. Areas of this soil are irregular in shape or are heart-shaped. They generally range from 3 to more than 40 acres in size. Rock outcrop makes up 5 to 10 percent of the mapped areas.

Typically, the surface layer of this soil is dark brown very channery silt loam 9 inches thick. The subsoil is yellowish brown very channery silt loam. Reddish gray fine grained sandstone is at a depth of 19 inches.

Included with this soil in mapping are small areas of Lordstown and Oquaga soils. Also included are areas that have less than 10 inches of soil material over bedrock and areas of Arnot-Rock outcrop complex.

This soil is moderately permeable. Available water capacity is very low. Where unlimed, this soil is extremely acid to medium acid throughout. Surface runoff is rapid. Rooting depth is restricted by bedrock.

This soil has poor potential for farming. Most areas are used for woodland. Small areas are used for pasture. This soil has poor potential for pasture and fair potential for woodland. The bedrock under this soil is a potential source of flagstone for buildings, floors, patios, and other construction (fig. 10).

Figure 10.—Flagstone quarry in an area of Arnot very channery silt loam, very rocky, 3 to 15 percent slopes.

A large acreage of this soil is wooded. Productivity is moderate, but rooting depth is restricted by bedrock. A major management hazard is seedling mortality because of very low available water capacity. Machine planting of large areas is generally practical.

Depth to bedrock is a limitation for waste disposal. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIs; woodland ordination symbol is 4d.

AsB—Arnot-Rock outcrop complex, 0 to 8 percent slopes. This map unit consists of nearly level to gently sloping, somewhat excessively drained, shallow soils and Rock outcrop on ridgetops and mountaintops. Areas of this unit are irregular in shape and generally range from 5 to more than 50 acres in size. This complex is about 50 percent Arnot soils, 30 percent Rock outcrop, and 20 percent other soils. Rock outcrop makes up 10 to 50 percent of the mapped areas.

The Arnot soils and areas of Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map. Rock outcrop is generally in small individual areas throughout the Arnot soils.

Typically, the surface layer of the Arnot soils is dark brown very channery silt loam about 2 inches thick. The subsoil is yellowish brown very channery silt loam to a depth of 14 inches. Below that is dark reddish gray fine grained sandstone bedrock.

Rock outcrop consists of weak red shale or dark reddish gray fine grained sandstone to gray fine and medium grained sandstone.

Included with this unit in mapping are areas of soils that are less than 10 inches deep and small areas of Lordstown and Oquaga soils. These areas make up about 15 to 25 percent of the unit.

The Arnot soils are moderately permeable. Available water capacity is very low. Where unlimed, the soils are extremely acid to medium acid throughout. Surface runoff is rapid on the Arnot soils, and it is very rapid on Rock outcrop. Rooting depth is restricted by bedrock.

Most areas of this unit are wooded. These soils have poor potential for farming and for most urban uses. The best use of these soils is for woodland wildlife habitat.

This map unit is in capability subclass VIIs; woodland ordination symbol is 4d.

AsD—Arnot-Rock outcrop complex, 8 to 25 percent slopes. This map unit consists of sloping to moderately steep, somewhat excessively drained, shallow soils and Rock outcrop on side slopes of upland ridges and mountaintops. Areas of this unit are long and narrow in shape and generally range from 5 to more than 40 acres in size. This complex is about 45 percent Arnot soils, 35 percent Rock outcrop, and 20 percent other soils. Rock outcrop makes up 10 to 50 percent of the mapped areas (fig. 11).

The Arnot soils and areas of Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map. Rock outcrop generally occurs as long, narrow, individual bedrock escarpments that are scattered throughout the Arnot soils.

Typically, the surface layer of the Arnot soils is dark brown very channery silt loam about 2 inches thick. The subsoil is yellowish brown very channery silt loam to a depth of 14 inches. Below that is dark reddish gray fine grained sandstone.

Rock outcrop consists of weak, red shale or fine grained sandstone to gray, fine and medium grained sandstone.

Included with this unit in mapping are areas of soils that are less than 10 inches deep and small areas of Lordstown and Oquaga soils. These areas make up about 15 to 25 percent of the unit.

The Arnot soils are moderately permeable. Available water capacity is very low. Where unlimed, the soils are extremely acid to medium acid throughout. Surface runoff in this unit is very rapid. Rooting depth is restricted by bedrock.

Most areas of this unit are wooded. Potential for woodland is moderate. The hazard of erosion is severe.

Figure 11.—Typical area of Arnot-Rock outcrop complex, 8 to 25 percent slopes.

All logging roads, skid trails, and loading areas should be constructed on the contour to control erosion. The use of logging equipment is restricted because of slope and bedrock outcrop.

This unit is poorly suited to crops and pasture. Rock outcrop, depth to rock, and slope are limitations for most nonfarm uses. The best use of these soils is for woodland wildlife habitat.

This map unit is in capability subclass VIIs; woodland ordination symbol is 4d.

ASE—Arnot-Rock outcrop complex, steep. This map unit consists of steep, somewhat excessively drained, shallow soils and Rock outcrop on steep valley walls and mountainsides and in cliffs along rivers. Areas of this unit are long and narrow in shape and generally range from 5 to more than 60 acres in size. This complex is about 40 percent Arnot soils, 25 percent Rock outcrop, and 35 percent other soils. Slopes range from 25 to 70 percent.

The Arnot soils and areas of Rock outcrop are in such intermingled patterns that they are not shown separately on the soil map. Areas of Rock outcrop are numerous, long, and narrow.

Typically, the surface layer of the Arnot soils is dark brown very channery silt loam about 2 inches thick. The subsoil is yellowish brown channery silt loam to a depth of 14 inches. Below that is dark reddish gray fine grained sandstone.

Rock outcrop consists of dark reddish gray fine grained sandstone.

Included with this unit in mapping are large areas of Lordstown, Oquaga, and Lackawanna soils. Because of the steepness of slope and inaccessibility of the areas it was not practical to separate these larger inclusions by conventional mapping methods. Included areas make up about 30 to 40 percent of the unit.

The Arnot soils are moderately permeable. Available water capacity is very low. Bedrock is at a depth of 10 to 20 inches. The soils are extremely acid to medium acid throughout. Surface runoff is very rapid.

Most areas of this unit are wooded and are poorly suited to most other uses. The hazard of erosion is very severe. The potential for woodland production is moderate. Depth to bedrock, rockiness, and steep slopes are limitations for most uses.

This map unit is in capability subclass VIIs; woodland ordination sybmol is 4d.

At—Atherton loam, ponded. This deep, very poorly drained soil is on outwash terraces, mainly in the stream valleys. Areas of this soil are long and narrow in shape and generally range from about 3 to more than 20 acres in size.

Typically, the surface layer of this soil is very dark gray loam about 9 inches thick. The upper part of the subsoil, to a depth of 20 inches, is light brownish gray, friable, gravelly heavy loam and has strong brown mottles. Below that, to a depth of 24 inches, is dark reddish brown, friable, gravelly sandy clay loam. The lower part of the subsoil, to a depth of 36 inches, is gray, friable, gravelly heavy sandy clay loam and has strong brown mottles. The substratum, to a depth of 60 inches, is grayish brown, friable, gravelly loam and has strong brown mottles.

Included with this soil in mapping are small areas of Rexford soils. Also included are areas of gravelly Atherton soils.

This soil is slowly permeable. Available water capacity is moderate to high. Where unlimed, this soil is strongly acid to slightly acid in the surface layer and subsoil and medium acid to slightly acid in the substratum. Surface runoff is very slow. This soil has a high water table near the surface for a long period during the year. Surface ponding is typical during wet periods. Rooting depth is restricted by the high water table.

Most areas of this soil are idle. The soil is too wet for cultivated crops, and drainage is not feasible. It can be used for pasture during dry periods. It has poor potential for trees.

This Atherton soil has some potential for pasture when it is not ponded. A few small areas are used for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is poorly suited to trees; however, a small part of the areas is wooded. Productivity is low because the rooting depth is restricted by the high water table. Use of equipment is restricted for long periods during the year because of the high water table.

The high water table is a limitation to most nonfarm uses of this soil. This soil has some potential for wildlife habitat and recreational uses.

This soil is in capability subclass Vw; woodland ordination symbol is 5w.

BaB—Bath channery silt loam, 3 to 8 percent slopes. This gently sloping, well drained soil is on broad ridges of rolling uplands. Areas of this soil are irregular in shape and generally range from 3 to 40 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 10 inches thick. The upper part of the subsoil, to a depth of about 30 inches, is yellowish brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is a fragipan. It is very firm and brittle, dark brown channery silt loam.

Included with this soil in mapping are small areas of Mardin and Lackawanna soils. Wet spots are in some areas. Also included are small areas of Bath soils that have numerous flagstones in the surface layer.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil. This soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is medium.

Most areas of this soil are used for cultivated crops, and potential is good for this use. Some areas are being developed for homesites. Slow permeability in the fragipan is a limitation for onsite waste disposal. This soil has good potential for pasture and trees.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, minimum tillage, and crop residue management help to reduce runoff and control erosion. If the topography is suitable, stripcropping is also helpful in reducing runoff and controlling erosion. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of grazing are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Bath soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are slight. Machine planting of large areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability in the subsoil is a limitation for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIe; woodland ordination symbol is 3o.

BaC—Bath channery silt loam, 8 to 15 percent slopes. This sloping, well drained soil is on side slopes of broad rolling uplands. Areas of this soil are irregular in shape and generally range from 3 to 40 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 10 inches thick. The upper part of the subsoil, to a depth of about 30 inches, is yellowish brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is a fragipan. It is very firm and brittle, dark brown channery silt loam.

Included with this soil in mapping are small areas of Mardin and Lackawanna soils. Wet spots are in some areas. Also included are small areas of Bath soils that have numerous flagstones in the surface layer.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil. This soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is medium to rapid.

Most areas of this soil are used for cultivated crops, and potential is good for this use. Some areas are being developed for homesites. Slow permeability in the fragipan is a limitation for onsite waste disposal. This soil has good potential for pasture and trees.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, minimum tillage, and crop residue management help to reduce runoff and control erosion. If the topography is suitable, stripcropping is also helpful in reducing runoff and controlling erosion. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Bath soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are slight. Machine planting of large areas is practical.

This soil has limitations for nonfarm uses. The slow permeability of the subsoil and slope are limitations for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIIe; woodland ordination symbol is 3o.

BaD—Bath channery silt loam, 15 to 25 percent slopes. This moderately steep, well drained soil is on side slopes of broad ridges. Areas of this soil are irregular in shape and generally range from 5 to 35 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 30 inches, is yellowish brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is a fragipan. It is very firm and brittle, dark brown channery silt loam.

Included with this soil in mapping are small areas of Mardin and Lackawanna soils. Wet spots are in some areas. Also included are small areas of Bath soils and soils that have numerous flagstones in the surface layer.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is low to moderate. Where unlimed, this soil is

very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil. The soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is rapid.

Most areas of this soil are used for pasture, and potential for this use is good. Some areas are being developed for homesites. The slow permeability in the fragipan is a limitation for onsite waste disposal. This soil has good potential for trees.

If cultivated crops are grown, the hazard of erosion is very severe. The use of cover crops, including grasses and legumes in the cropping system, minimum tillage, and crop residue management help reduce runoff and control erosion. If the topography is suitable, stripcropping is also helpful in reducing runoff and contolling erosion. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are slight to moderate. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion.

This soil has limitations for most nonfarm uses. The slow permeability of the subsoil and slope are limitations for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVe; woodland ordination symbol is 3r.

BbB—Bath extremely stony silt loam, 3 to 8 percent slopes. This nearly level and gently sloping, well drained soil is on broad rolling uplands. Areas of this soil are irregular in shape and generally range from 5 to 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 30 inches, is yellowish brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is a fragipan. It is very firm and brittle, dark brown channery silt loam.

Included with this soil in mapping are small areas of Mardin, Lackawanna, and Lordstown soils. Wet spots are in some areas. Also included are small areas of nonstony soils.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is low to moderate. This soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil. This soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is slow to medium.

Most areas of this soil are used for woodland, and potential is good for this use. Some areas are being developed for homesites. Slow permeability in the fragipan and surface stones limit onsite waste disposal. This soil has good potential for trees. It has poor potential for pasture and cropland because of large surface stones.

This soil is suited to trees, and nearly all of the acreage is wooded. Productivity is moderately high, but rooting depth is restricted by the fragipan. Management hazards are slight to moderate. Machine planting is not practical because of large stones.

This soil has limitations for nonfarm uses. The slow permeability in the subsoil and stones are limitations for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

BbD—Bath extremely stony silt loam, 8 to 25 percent slopes. This sloping and moderately steep, well drained soil is on broad rolling uplands. Areas of this soil are irregular in shape and generally range from 5 to 50 acres in size. Stones cover about 3 to 30 percent of the surface.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 30 inches, is yellowish brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is a fragipan. It is very firm and brittle, dark brown channery silt loam.

Included with this soil in mapping are small areas of Mardin, Lackawanna, and Lordstown soils. Wet spots are in some areas. Also included are small areas of nonstony soils.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is low to moderate. This soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil. It is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is medium to rapid.

Most areas of this soil are used for woodland, and potential is good for this use. Some areas are being developed for homesites. The slow permeability in the fragipan and surface stones limit onsite waste disposal. This soil has good potential for trees. It has poor potential for pasture and cropland because of slope and numerous surface stones.

This soil is suited to trees, and nearly all of the acreage is wooded. Productivity is moderately high, but root-

ing depth can be restricted by the fragipan. Management hazards are moderate. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting is not practical because of large stones.

This soil has limitations for nonfarm uses. The slow permeability of the subsoil, surface stones, and slope are limitations for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

BcB—Braceville gravelly loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil is on stream terraces. Slopes are generally plane. Areas of this soil are irregular in shape and generally range from 3 to more than 15 acres in size.

Typically, the surface layer of this soil is dark yellowish brown gravelly loam about 9 inches thick. The subsoil extends to a depth of 37 inches. The upper part of the subsoil, to a depth of about 19 inches, is yellowish brown gravelly silt loam; the middle part, to a depth of 27 inches, is firm and brittle, dark yellowish brown gravelly silt loam; and the lower part, to a depth of 37 inches, is firm and brittle, dark brown gravelly sandy loam. The substratum, to a depth of 72 inches, is dark yellowish brown very gravelly loam.

Included with this soil in mapping are small areas of Rexford and Wyoming soils. Also included are a few scattered areas of a soil that is similar to this Braceville soil but has few or no pebbles.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is slow. The subsoil has a firm fragipan at a depth of about 19 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil and in the substratum.

Most areas of this soil are cultivated. A few small areas are used for building sites. This soil has fair potential for farming, and it is suited to cultivated crops. It has very good potential for trees.

If cultivated crops are grown, the seasonal high water table is a limitation. The hazard of erosion is slight to moderate. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. The gravelly surface may interfere with the seeding and harvesting of some crops.

This Braceville soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees; however, only a small acreage is wooded. Productivity is high. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIw; woodland ordination symbol is 2o.

Da—Dumps, mine. Mine dumps in Lackawanna County consist of dark, highly carbonaceous, acid shale material that was separated from coal during the coal processing operation. This material contains little or no soil and does not support vegetation. Areas are throughout the Lackawanna Valley. Slopes range from 0 to 75 percent but are dominantly 25 to 75 percent.

Mine dumps are commonly near Udorthents, strip mine soils. Because of the nature of the shale material, they are generally idle and have very limited potential. Some areas have been leveled and filled over for building sites.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

Db—Dumps, burned mine. Burned mine dumps in Lackawanna County consist of reddish cinderlike material that results from the burning of mine dump waste. Most areas are burned out, or fires have been extinguished. These areas contain little or no soil material and do not support vegetation. They are scattered throughout the Lackawanna Valley. Slopes range from 0 to 75 percent.

Burned mine dumps are commonly near Udorthents, strip mine soils. Because of the nature of the material, they have limited use. Some areas have been used as a source of cinder material for highways during winter. Small areas have been leveled, filled over, and used as building sites.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

DYD—Dystrochrepts and Rock outcrop, moderately steep. These nearly level to moderately steep, shallow to deep, well drained and somewhat excessively drained soils and Rock outcrop are on mountaintops, on side slopes, and in cliff areas along the Susquehanna River. The areas are irregular in shape and range from about 3 to more than 100 acres in size. Dystrochrepts

have a cover of more than 50 percent stone, and areas of Rock outcrop contain more than 90 percent outcrops. Individual mapped areas can contain only Dystrochrepts, only Rock outcrop, or a combination of both. Dystrochrepts make up about 45 percent of the unit and Rock outcrop about 20 percent. Slopes range from 0 to 25 percent.

Typically, the surface layer of Dystrochrepts is channery or very channery silt loam or loam 1 inch to 4 inches thick. The subsoil is channery or very channery loam or silt loam to a depth of 60 inches or more. The substratum is channery or very channery silt loam or loam. Rock fragments make up 15 to 70 percent of individual layers.

Rock outcrop consists of exposures of solid bedrock. Bedrock exposures are mostly hard, red and gray sandstone, but they are siltstone and shale in some areas.

Included with this unit in mapping are areas of Arnot channery silt loam, Lordstown extremely stony silt loam, and Oquaga extremely stony loam. Also included are small areas of organic soils that have bedrock at a depth of 10 inches or less. The included areas in this unit are generally larger in size than included areas in most map units in this survey.

Dystrochrepts are moderately to rapidly permeable. Available water capacity is low to very low. Bedrock is at a depth of 10 to 60 inches or more. Reaction ranges from strongly acid to extremely acid throughout.

Most areas of this unit are in woodland. Small areas near Scranton are used for building sites. Stones on the surface and depth to bedrock are limitations to most uses of these soils. Potential for woodland or wildlife habitat is poor to fair. The cover of stones and depth to bedrock cause difficulty in managing and harvesting trees and limit the use of these soils for farming and for urban or recreational uses.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

DYE—Dystrochrepts and Rock outcrop, steep. These steep, shallow to deep, well drained to somewhat excessively drained soils and Rock outcrop are on mountainsides and in cliff areas along the Susquehanna River. The areas are irregular to long and narrow in shape and range from about 3 to more than 150 acres in size. Dystrochrepts have a cover of more than 50 percent stone, and areas of Rock outcrop contain more than 90 percent outcrops. Individual mapped areas can contain only Dystrochrepts, only Rock outcrop, or a combination of both. Dystrochrepts make up about 45 percent of the unit and Rock outcrop about 20 percent. Slopes range from 25 to 70 percent.

Typically, the surface layer of Dystrochrepts is channery or very channery silt loam or loam 1 inch to 4 inches thick. The subsoil is channery or very channery loam or silt loam to a depth of 60 inches or more. The substratum is channery or very channery silt loam or loam. Rock fragments make up 15 to 70 percent of individual layers.

Rock outcrop consists of exposures of solid bedrock. Bedrock exposures are mostly hard, red and gray sandstone, but they are siltstone and shale in some areas.

Included with this unit in mapping are areas of Arnot channery silt loam, Lordstown extremely stony silt loam, and Oquaga extremely stony loam. The included areas in this unit are generally larger in size than included areas in most map units in this survey.

These soils are moderately to rapidly permeable. Available water capacity is low to very low. Bedrock is at a depth of 10 to 60 inches or more. Reaction ranges from strongly acid to extremely acid throughout.

Most areas of this unit are in woodland. Stones on the surface, steep slopes, and depth to bedrock are limitations to most uses of these soils. This map unit has some potential for woodland, wildlife habitat, and aesthetic uses. The cover of stones and steep slopes cause difficulty in managing and harvesting trees.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

FA—Fluvents and Fluvaquents. These nearly level, deep, excessively drained to very poorly drained soils are along streams and rivers and on islands throughout the survey area. Areas of these soils are generally long and narrow and range from about 3 to more than 40 acres in size. They are subject to frequent flooding. Individual mapped areas can contain only Fluvents, only Fluvaquents, or a combination of both. Fluvents make up about 40 percent of unit and Fluvaquents about 30 percent.

Typically, the surface layer of Fluvents is loamy sand to silt loam as much as 6 inches thick. It is gravelly or very gravelly in some places. The substratum is sand to loam and is gravelly or very gravelly in some places. Rock fragments make up 0 to 80 percent of individual layers.

Typically, the surface layer of Fluvaquents is sandy loam to silt loam as much as 8 inches thick. It is gravelly in some places. The substratum is stratified sandy loam to silty clay loam and is gravelly in some places. Rock fragments make up 0 to 40 percent of individual layers.

Included with this unit in mapping are areas of Holly silt loam; Philo silt loam; Holly silt loam, ponded; and Pope soils. The included areas in this unit are generally larger than the included areas in most map units in this survey.

Fluvents are moderately to rapidly permeable, and Fluvaquents are moderately slowly to slowly permeable. Available water capacity is moderate to very low. Reaction ranges from extremely acid to strongly acid throughout.

Most areas of this unit are in woodland. Small areas are used for pasture. These soils have limited potential for all uses because of frequent flooding and the variable

soil texture. They are best suited to wildlife habitat and aesthetic uses because of the frequent flooding.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

HA—Haplaquents, stony. These nearly level, deep, poorly drained and very poorly drained soils are in flat depressions on mountaintops. Areas of these soils are irregular to long and narrow in shape and range from about 3 to more than 40 acres in size.

The surface layer of these soils is extremely stony silt loam to sandy loam. The substratum is mottled channery or very channery sandy loam to loam. Rock fragments make up 0 to 80 percent of individual layers.

Included with these soils in mapping are areas of Norwich and Chippewa extremely stony silt loams, Medisaprists, and Medihemists. Also included are areas of Haplaquents that have organic soil material between the voids of the surface stones. The included areas in this unit can be larger than included areas in most map units in this survey.

These soils have a seasonal high water table at a depth of 2 feet or less during most of the year. Bedrock is generally deeper than 4 feet. Reaction is extremely acid to strongly acid throughout.

Most areas of these soils are in state game lands. Vegetation consists mostly of a mat of cushion moss, blueberry bushes, and scrub tree growth. The stony surface and the seasonal high water table are limitations to most uses of these soils. These soils have limited potential for wildlife habitat because of the stony surface.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

Hm—Holly silt loam. This deep, poorly drained, nearly level soil is on flood plains. Areas of this soil are long and narrow in shape and generally range from 3 to 30 acres in size.

Typically, the surface layer of this soil is dark gray silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 16 inches, is dark grayish brown silt loam. The lower part of the subsoil, to a depth of 40 inches, is light brownish gray and gray sandy loam. The substratum, to a depth of 60 inches, is light reddish gravelly loamy sand.

Included with this soil in mapping are small areas of Philo soils; Holly silt loam, ponded; and Fluvents and Fluvaquents. Also included are areas of soils that are similar to this Holly soil but are somewhat poorly drained.

This soil is moderately slowly permeable. Available water capacity is high. Where unlimed, this soil is strongly acid to slightly acid throughout. The soil has a high water table at a depth of 6 inches or less for long periods during the year. Surface runoff is very slow. Rooting depth is restricted by the high water table.

Most areas of this soil are used for woodland or pasture. This soil can be used for row crops if it is properly drained. It has fair potential for trees.

If cultivated crops are grown, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by floodwater following intensive rains. Opening drains where outlets are available, and keeping drainageways open can improve drainage and remove excess water from the surface.

This Holly soil has fair potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to moisture-tolerant trees. A medium acreage of this soil is wooded. Productivity is low because the rooting depth is restricted by the high water table. Use of equipment is restricted for long periods during the year because of the high water table. Machine planting of large areas is practical.

The high water table and flooding are limitations to most nonfarm uses of this soil. This soil has some potential for wildlife habitat development. It is poorly suited to most recreational uses.

This soil is in capability subclass IIIw; woodland ordination symbol is 5w.

Ho—Holly silt loam, ponded. This deep, very poorly drained, nearly level soil is on flood plains. Areas of this soil are long and narrow in shape and generally range from about 3 to more than 40 acres in size.

Typically, the surface layer of this soil is dark gray silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 16 inches, is dark grayish brown silt loam. The lower part of the subsoil, to a depth of 40 inches, is light brownish gray and gray sandy loam. The substratum, to a depth of 60 inches, is light reddish brown gravelly loamy sand.

Included with this soil in mapping are large areas of Holly silt loam that are not ponded and small areas of Fluvents and Fluvaquents. Also included are areas of soils that are similar to this Holly soil but are somewhat poorly drained.

This soil is moderately slowly permeable. Available water capacity is high. Where unlimed, this soil is strongly acid to slightly acid throughout. This soil has a high water table at the surface during most of the year. Surface runoff is very slow to ponded. Rooting depth is restricted by the high water table.

Most areas of this soil are used for woodland or for wildlife habitat. Because of the low lying position of this soil on the flood plain, drainage is impractical. This soil has poor potential for farming, woodland, and most nonfarm uses. It has good potential for wetland wildlife habitat.

The high water table and hazard of flooding are the main limitations to most uses of this soil.

This soil is in capability subclass Vw; woodland ordination symbol is 5w.

LaB—Lackawanna channery loam, 3 to 8 percent slopes. This gently sloping, well drained soil is on broad rolling ridgetops. Areas of this soil are irregular in shape and generally range from 3 to 20 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 10 inches thick. The upper part of the subsoil, to a depth of 20 inches, is reddish brown channery loam. The lower part of the subsoil, to a depth of 50 inches, is a fragipan. It is firm to very firm weak red channery silt loam. The substratum, to a depth of 60 inches, is reddish brown channery loam.

Included with this soil in mapping are small areas of Wellsboro and sloping Lackawanna soils. Wet spots are in some areas of this soil. Also included are small areas of Bath soils and soils that have numerous flagstones in the surface layer.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is very low to low. Where unlimed, this soil is very strongly acid or strongly acid in the surface layer and upper part of the subsoil and very strongly acid to medium acid in the lower part of the subsoil and in the substratum. This soil is well drained, however, it can have a perched water table for short periods during wet seasons. Surface runoff is medium.

Most areas of this soil are used for cultivated crops, and potential is good for this use. This soil has good potential for wildlife habitat. Some areas are being developed for homesites. The slow permeability in the fragipan limits onsite waste disposal. This soil has good potential for pasture and trees and for recreation.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, minimum tillage, and crop residue management help to reduce runoff and control erosion. If the topography is suitable, stripcropping is also helpful in reducing runoff and controlling erosion. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This soil is suited to trees; however, only a small acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are slight. Machine planting of large areas is practical.

This soil has limitations for many nonfarm uses. The slow permeability in the subsoil is a limitation for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIe; woodland ordination symbol is 3o.

LaC—Lackawanna channery loam, 8 to 15 percent slopes. This sloping, well drained soil is on side slopes of broad ridges. Areas of this soil are irregular in shape and generally range from 5 to 25 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 10 inches thick. The upper part of the subsoil, to a depth of 20 inches, is reddish brown channery loam. The lower part of the subsoil, to a depth of 50 inches is a fragipan. It is firm to very firm, weak red channery silt loam. The substratum, to a depth of 60 inches, is reddish brown channery loam.

Included with this soil in mapping are small areas of Wellsboro soils and gently sloping and moderately steep Lackawanna soils. Wet spots are in some areas. Also included are small areas of Bath soils and soils that have numerous flagstones in the surface layer.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is very low to low. Where unlimed, this soil is very strongly acid or strongly acid in the surface layer and upper part of the subsoil and very strongly acid to medium acid in the lower part of the subsoil and in the substratum. This soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is medium to rapid.

Most areas of this soil are used for cultivated crops, and potential is good for this use. This soil has good potential for wildlife habitat. Some areas are being developed for homesites. Slow permeability in the fragipan limits onsite waste disposal. This soil has good potential for pasture and trees and has fair potential for recreation.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, minimum tillage, and crop residue management help to reduce runoff and control erosion. If the topography is suitable, stripcropping is also helpful in reducing runoff and controlling erosion. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This soil is suited to trees; however, only a small acreage is wooded. Productivity is moderately high, but rooting depth is restricted by the fragipan. Management hazards are slight. Machine planting of large areas is practical.

This soil has limitations for many nonfarm uses. The slow permeability in the subsoil and slope are serious limitations for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIIe; woodland ordination symbol is 3o.

LaD—Lackawanna channery loam, 15 to 25 percent slopes. This moderately steep, well drained soil is on side slopes of broad ridges and at the base of steep mountain slopes. Areas of this soil are irregular in shape and generally range from 5 to 25 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 10 inches thick. The upper part of the subsoil, to a depth of 20 inches, is reddish brown channery loam. The lower part of the subsoil, to a depth of 50 inches, is a fragipan. It is firm to very firm, weak red channery silt loam. The substratum, to a depth of 60 inches, is reddish brown channery loam.

Included with this soil in mapping are small areas of Wellsboro and Oquaga soils. Wet spots are in some areas. Also included are small areas of Bath soils and soils that have numerous flagstones in the surface layer.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is very low to low. Where unlimed, this soil is very strongly acid or strongly acid in the surface layer and upper part of the subsoil and very strongly acid to medium acid in the lower part of the subsoil and in the substratum. This soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is rapid.

Most areas of this soil are used for pasture, and potential is good for this use. This soil has good potential for wildlife habitat and for pasture and trees. Some areas are being developed for homesites. Potential is limited for homesites with onsite waste disposal because of slow permeability in the fragipan and because of slope. This soil has poor potential for recreation because of slope.

If cultivated crops are grown, the hazard of erosion is very severe. The use of cover crops, including grasses and legumes in the cropping system, minimum tillage, and crop residue management help to reduce runoff and control erosion. If the topography is suitable, stripcropping is also helpful in reducing runoff and controlling erosion. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are slight to moderate. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting of large areas is practical.

This soil has limitations for nonfarm uses. Slow permeability in the subsoil and slopes are limitations for onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVe; woodland ordination symbol is 3r.

LbB—Lackawanna extremely stony loam, 3 to 8 percent slopes. This nearly level and gently sloping, well drained soil is on broad ridges of rolling uplands. Areas of this soil are irregular in shape and generally range from 15 to 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark reddish brown channery loam about 1 inch thick. The upper part of the subsoil, to a depth of about 20 inches, is reddish brown channery loam. The lower part of the subsoil, to a depth of 50 inches, is a fragipan. It is firm and very firm, weak red channery silt loam. The substratum, to a depth of 60 inches, is reddish brown channery loam.

Included with this soil in mapping are small areas of Wellsboro and Bath soils. Wet spots are in some areas. Also included are small areas of nonstony soils.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is very low to low. This soil is very strongly acid or strongly acid in the surface layer and upper part of the subsoil and very strongly acid to medium acid in the lower part of the subsoil and in the substratum. This soil is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is slow to medium.

Most areas of this soil are used for woodland, and potential is good for this use. This soil has good potential for woodland wildlife habitat. Some areas are being developed for homesites. Slow permeability of the fragipan and large surface stones limit homesites with onsite waste disposal. This soil has poor potential for pasture and cropland because of surface stones.

This soil is suited to trees. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are slight to moderate. Machine planting is not practical because of large stones.

This soil has limitations for nonfarm uses. The slow permeability and stones are limitations for onsite waste disposal.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

LbD—Lackawanna extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, well

drained soil is on side slopes of rolling uplands and at the base of steep mountain areas. Areas of this soil are irregular in shape and generally range from 15 to 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark reddish brown channery loam about 1 inch thick. The upper part of the subsoil, to a depth of about 20 inches, is reddish brown channery loam. The lower part of the subsoil, to a depth of 50 inches, is a fragipan. It is firm and very firm, weak red channery silt loam. The substratum, to a depth of 60 inches, is reddish brown channery loam.

Included with this soil in mapping are small areas of Wellsboro and Bath soils. Wet spots are in some areas. Also included are small areas of nonstony soils.

This soil is moderately permeable above the fragipan and slowly permeable in the fragipan. Available water capacity is very low to low. This soil is very strongly acid or strongly acid in the surface layer and upper part of the subsoil and very strongly acid to medium acid in the lower part of the subsoil and in the substratum. It is well drained; however, it can have a perched water table for short periods during wet seasons. Surface runoff is medium.

Most areas of this soil are used for woodland, and potential is good for this use. This soil has good potential for woodland wildlife habitat. It has limited potential for homesites with onsite waste disposal because of slow permeability in the fragipan and large stones on the surface. It has poor potential for pasture and cropland because of large stones and slope.

This soil is suited to trees, and almost all of the acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Management hazards are moderate. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting is not practical because of large stones.

The slow permeability, stones, and slope are severe limitations for onsite waste disposal.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

LCE—Lackawanna and Bath extremely stony loams, steep. These steep, deep, well drained soils are on lower slopes of mountainsides and on the sides of ravines. Areas of these soils are generally long and narrow in shape and range from about 5 to more than 100 acres in size. They are made up of only the Lackawanna soil, only the Bath soil, or a combination of both soils. This map unit is about 40 percent Lackawanna soil and 30 percent Bath soil. Because of stoniness and steep slopes, the areas of these soils were not investigated as thoroughly as other units. Separation of these soils in mapping was not practical or necessary for the expected use. Stones cover about 15 to 30 percent of the surface. Slopes range from 25 to 70 percent.

Typically, the surface layer of the Lackawanna soil is dark reddish brown channery loam about 1 inch thick. The upper part of the subsoil, to a depth of about 20 inches, is reddish brown channery loam. The lower part of the subsoil, to a depth of 50 inches or more, is a fragipan. It is firm and very firm, weak red channery silt loam. The substratum, to a depth of 60 inches, is reddish brown channery loam.

Typically, the surface layer of the Bath soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 30 inches, is yellowish brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches or more, is a fragipan. It is very firm and brittle, dark brown channery silt loam.

Included with these soils in mapping are large areas of Lordstown, Oquaga, Wellsboro, and Mardin soils. The included areas in this unit are generally larger than included areas in most map units of this survey.

These soils are slowly permeable. Available water capacity is low to moderate in the Bath soil and very low to low in the Lackawanna soil. Surface runoff is rapid. Rooting depth is restricted by the fragipan. Natural reaction of the Lackawanna soil is very strongly acid or strongly acid in the surface layer and upper part of the subsoil and very strongly acid to medium acid in the lower part of the subsoil and in the substratum. Reaction of the Bath soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Stones and very steep slopes are limitations of these soils for cropland, pasture, recreation, or nonfarm uses. These soils have some potential for wildlife habitat.

Most areas of these soils are in woodland. Productivity is moderately high. Management and harvesting of trees is difficult because of the extremely stony surface and steep slopes. The hazard of erosion is moderate, and equipment limitations are severe. During harvesting, all logging roads, skid trails, and loading areas should be constructed on the contour to reduce erosion.

This map unit is in capability subclass VIIs; woodland ordination symbol is 3x.

LeB—Lordstown channery silt loam, 3 to 8 percent slopes. This gently sloping, moderately deep, well drained soil is on ridgetops and in broad level areas of mountaintops and hillside benches. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 20 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow channery silt loam; the lower part, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot, Oquaga, and Bath soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to strongly acid in the surface layer and strongly acid to medium acid in the substratum. Surface runoff is medium. Rooting depth can be restricted by bedrock.

This soil has fair potential for cultivated crops, and most areas are used for cultivated crops and pasture. It has good potential for pasture and woodland.

If cultivated crops are grown, the hazard of erosion is moderate. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A moderate acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low and moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for nonfarm uses. Depth to bedrock is a limitation for waste disposal. If this soil is disturbed for construction, management is needed in places to control erosion and sediment.

This soil is in capability subclass IIe; woodland ordination symbol is 3f.

LeC—Lordstown channery silt loam, 8 to 15 percent slopes. This sloping, moderately deep, well drained soil is on side slopes of upland ridges and mountains. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 20 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow channery silt loam; the lower part, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot, Oquaga, and Bath soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to strongly acid in the surface layer and subsoil and strongly acid to medium acid in the substratum. Surface runoff is medium to rapid. Rooting depth can be restricted by bedrock.

This soil has fair potential for cultivated crops, and most areas are used for pasture and hayland. It has good potential for pasture and woodland. Depth to bedrock limits most nonfarm uses.

If cultivated crops are grown, the hazard of erosion is severe. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

Some areas of this soil are wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low and moderate available water capacity. Machine planting of large areas is generally practical.

Depth to bedrock is a limitation for onsite waste disposal. If this soil is disturbed for construction, management is needed in places to control erosion and sediment.

This soil is in capability subclass IIIe; woodland ordination symbol is 3f.

LeD—Lordstown channery silt loam, 15 to 25 percent slopes. This moderately steep, moderately deep, well drained soil is on side slopes of upland ridges and mountains. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 5 to 20 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow channery silt loam; the lower part, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot, Oquaga, and Bath soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, the soil is very strongly acid to strongly acid in the surface layer and subsoil and strongly acid to medium acid in the substratum. Surface runoff is rapid. Rooting depth can be restricted by bedrock.

This soil has poor potential for cultivated crops, and most areas are used for pasture or woodland. It has fair potential for pasture and good potential for woodland. Depth to bedrock and slope are limitations for most nonfarm uses.

If cultivated crops are grown, the hazard of erosion is very severe. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

Most areas of this soil are wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low and moderate available water capacity. The hazard of erosion is slight, and the equipment limitations are moderate for logging operations. During harvesting, all logging roads, skid trails, and loading areas should be constructed on the contour to reduce erosion. Machine planting of large areas is generally practical.

This soil has limitations for nonfarm uses. Depth to bedrock and steep slopes are limitations for most nonfarm uses and for waste disposal.

This soil is in capability subclass IVe; woodland ordination symbol is 3r.

LfB—Lordstown flaggy silt loam, 3 to 8 percent slopes. This gently sloping, moderately deep, well drained soil is on ridgetops and in broad level areas of mountaintops and hillside benches. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 65 acres in size.

Typically, the surface layer of this soil is very dark grayish brown flaggy silt loam about 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow flaggy silt loam; the lower part, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot, Oquaga, Bath, and nonflaggy Lordstown soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to strongly acid in the surface layer and subsoil and strongly acid to medium acid in the substratum. Surface runoff is medium. Rooting depth can be restricted by bedrock.

This soil has fair potential for cultivated crops, and most areas are used for pasture and hay because of flagstones on the surface. It has good potential for pasture and woodland. The depth to bedrock and the flaggy surface are limitations for most nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. Surface flagstones interfere with the seeding and harvesting of most crops. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A large acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low to moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for nonfarm uses. Depth to bedrock and the flaggy surface are limitations for onsite waste disposal. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIIs; woodland ordination symbol is 3f.

LfC—Lordstown flaggy silt loam, 8 to 15 percent slopes. This sloping, moderately deep, well drained soil is on side slopes of upland ridges and mountains. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 60 acres in size.

Typically, the surface layer of this soil is very dark grayish brown flaggy silt loam about 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow flaggy silt loam. The lower part of the subsoil, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot, Oquaga, Bath, and nonflaggy Lordstown soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to strongly acid in the surface layer and subsoil and strongly acid to medium acid in the

substratum. Surface runoff is medium to rapid. Rooting depth can be restricted by bedrock.

This soil has poor potential for cultivated crops, and most areas are used for pasture and hay because of flagstones and slope. It has good potential for pasture and woodland. The depth to bedrock and the flaggy surface are limitations for many nonfarm uses.

If cultivated crops are grown, the flaggy surface and hazard of erosion need to be considered. Surface flagstones interfere with the seeding and harvesting of most crops. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A large acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low to moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for nonfarm uses. Depth to bedrock is a limitation for onsite waste disposal. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVs; woodland ordination symbol is 3f.

LxB—Lordstown extremely stony silt loam, 3 to 8 percent slopes. This nearly level and gently sloping, moderately deep, well drained soil is on ridgetops and broad level mountaintops and hillside benches. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow channery silt loam. The lower part of the subsoil, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot, Oquaga, Bath, and nonstony Lordstown soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to strongly acid in the surface layer and subsoil and strongly acid to medium acid in the substratum. Surface runoff is medium. Rooting depth can be restricted by bedrock.

Most areas of this soil are used for woodland. This soil has poor potential for cultivated crops and pasture and good potential for woodland. Surface stones and depth to bedrock are limitations for most nonfarm uses.

Almost all areas of this soil are wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low to moderate available water capacity. This soil has equipment limitations for logging operations because of numerous surface stones. Machine planting of areas is generally not practical because of the stones.

This soil has limitations for most nonfarm uses. Surface stones and depth to bedrock are limitations for onsite waste disposal. This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

LxD—Lordstown extremely stony silt loam, 8 to 25 percent slopes. This gently sloping and moderately steep, moderately deep, well drained soil is on side slopes of upland ridges and mountainsides. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 5 to 75 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil to a depth of 10 inches, is brownish yellow channery silt loam. The lower part of the subsoil, to a depth of 20 inches, is pale brown channery silt loam. The substratum, to a depth of 26 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas of Arnot soils. Also included are small areas of Oquaga, Bath, and nonstony Lordstown soils.

This soil is moderately permeable. Available water capacity is low to moderate. Where unlimed, this soil is very strongly acid to strongly acid in the surface layer and subsoil and strongly acid to medium acid in the substratum. Surface runoff is medium to rapid. Rooting depth can be restricted by bedrock.

Most areas of this soil are used for woodland. This soil has poor potential for cultivated crops and pasture and good potential for woodland. Surface stones and depth to bedrock are limitations for most nonfarm uses.

Almost all areas of this soil are wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the low to moderate available water capacity. Logging roads, skid trails, and loading areas should be constructed on the contour to reduce erosion. Machine planting of areas is generally not practical because of the stones.

The soil has limitations for most nonfarm uses. Surface stones, slope, and depth to bedrock are limitations for onsite waste disposal. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

McB—Mardin channery silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad rolling uplands. Slopes are convex and smooth. Areas of this soil are irregular in shape and range from 3 to more than 40 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown and dark brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Volusia and sloping Mardin soils. Also included are a few scattered areas of Wellsboro and Bath soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout the profile.

Most areas of this soil are cultivated or in pasture. A few small areas are used for building sites. This soil is well suited to cultivated crops and pasture. It has good potential for trees. Slow permeability of the lower part of the subsoil and the seasonal high water table limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Mardin soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a moderate acreage is wooded. Productivity is moderately high. Removal of undesirable species helps increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for nonfarm uses. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIw; woodland ordination symbol is 3o.

McC—Mardin channery silt loam, 8 to 15 percent slopes. This sloping, moderately well drained soil is on broad rolling uplands. Slopes are generally smooth and slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown and dark brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Volusia and gently sloping Mardin soils. Also included are a few scattered areas of Wellsboro and Bath soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium to rapid. The subsoil has a fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches of the surface for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated or in pasture. A few small areas are used for building sites. This soil is suited to cultivated crops and pasture. It has good potential for trees. Slow permeability in the lower part of the subsoil and a seasonal high water table limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Mardin soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. Slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIe; woodland ordination symbol is 3o.

McD—Mardin channery silt loam, 15 to 25 percent slopes. This moderately steep, moderately well drained soil is on side slopes of ridges and ravines. Slopes are slightly convex. Areas of this soil are generally long and narrow in shape and range from 3 to more than 20 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown and dark brown channery silt loam. The lower part of the subsoil, to a depth of about 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Bath, Volusia, and sloping Mardin soils. Also included are a few scattered areas of Wellsboro and flaggy Mardin soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is rapid. The subsoil has a fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout the profile.

Most areas of this soil are in pasture or woodland. A few small areas are in cultivated crops. This soil has fair potential for farming. It is suited to woodland. Slow permeability in the lower part of the subsoil, a seasonal high water table, and slope are limitations for most nonfarm uses.

If cultivated crops are grown, the hazard of erosion is very severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Mardin soil has fair potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. All logging roads, skid trails, and loading areas should be constructed on the contour to reduce erosion. Use of equipment is restricted because of slope and the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. Slow permeability, slope, and the seasonal high water table are limitations for waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVe; woodland ordination symbol is 3r.

MfB—Mardin flaggy silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad rolling uplands. Slopes are convex and smooth. Areas of this soil are irregular in shape and range from 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark grayish brown flaggy silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown flaggy silt loam and dark brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Volusia and Bath soils. Also included are a few scattered areas of Wellsboro and nonflaggy soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid.

Most areas of this soil are cultivated or in pasture. A few small areas are used for building sites. This soil has fair potential for cultivated crops, however, surface flagstones may interfere with the seeding and harvesting of crops (fig. 12). This soil is suited to pasture or hayland. It has good potential for trees. Slow permeability in the lower part of the subsoil, the seasonal high water table, and flagstones on the surface limit this soil for many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Mardin soil has good potential for pasture. Controlling grazing is the major concern in management. If

Figure 12.—Typical area of Mardin flaggy silt loam, 3 to 8 percent slopes. Surface flagstones may interfere with the seeding and harvesting of crops.

the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability, flagstones on the surface, and a seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIs; woodland ordination symbol is 3o.

MfC—Mardin flaggy silt loam, 8 to 15 percent slopes. This sloping, moderately well drained soil is on broad rolling uplands. Slopes are generally smooth and slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark grayish brown flaggy silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown flaggy silt loam and dark brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Volusia and Bath soils. Also included are a few scattered areas of Wellsboro and nonflaggy soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium to rapid. The subsoil has a fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are in hayland or pasture. A few small areas are in cultivated crops. This soil has only fair potential for cultivated crops because of the surface flagstones and slope. It is suited to pasture. The surface flagstones interfere in places with the seeding and harvesting of crops. This soil has good potential for trees. Slow permeability in the lower part of the subsoil, a seasonal high water table, flagstones on the surface, and slope limit this soil for many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Mardin soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. Slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IVs; woodland ordination symbol is 3o.

MhB—Mardin extremely stony silt loam, 3 to 8 percent slopes. This gently sloping, moderately well

drained soil is on broad rolling uplands. Slopes are convex and smooth. Areas of this soil are irregular in shape and range from 5 to more than 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown and dark brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Volusia and Bath soils. Also included are a few scattered areas of Wellsboro and nonstony soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are in woodland. A few small areas are used for building sites. This soil has poor potential for cultivated crops or pasture because of the extremely stony surface. It is well suited to woodland and has good potential for trees. Slow permeability in the lower part of the subsoil and a seasonal high water table limit most nonfarm uses.

This Mardin soil is suited to trees, and a large acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted because of surface stones and the seasonal high water table. Machine planting is not practical.

This soil has limitations for most nonfarm uses.

The slow permeability, the seasonal high water table, and extremely stony surface are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

MhD—Mardin extremely stony silt loam, 8 to 25 percent slopes. This sloping and moderately steep, moderately well drained soil is on side slopes of ridges and ravines. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 5 to more than 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown and dark brown channery silt loam. The lower part of the subsoil, to a depth of 60 inches, is brown, very firm and brittle channery loam.

Included with this soil in mapping are small areas of Volusia and Bath soils. Also included are a few scattered areas of Wellsboro soils and nonstony soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium to rapid. The subsoil has a fragipan at a depth of about 20 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are in woodland. A few small areas are in pasture. This soil has poor potential for cultivated crops or pasture because of the extremely stony surface. It is suited to woodland and has good potential for trees. Slow permeability in the lower part of the subsoil limits this soil for many nonfarm uses.

This Mardin soil is suited to trees, and a large acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, all logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table, slope, and the extremely stony surface. Machine planting is not practical.

This soil has limitations for most nonfarm uses.

The slow permeability, stony surface, and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

MK—Medisaprists and Medihemists. These nearly level, deep, very poorly drained organic soils are in swamps, on mountaintops, and on rolling uplands. Areas of these soils are irregular or oval in shape and range from about 3 to more than 50 acres in size. Individual areas can contain only Medisaprists, only Medihemists, or a combination of both soils. They are made up of about 40 percent Medisaprists and about 35 percent Medihemists.

The surface layer of Medisaprists is dark reddish brown to black muck 10 to 51 or more inches thick. The underlying layers of organic material, to a depth of 51 inches or more, consist of highly decomposed woody fragments, herbaceous material, or sphagnum peat.

The surface layer of Medihemists is dark reddish brown to black mucky peat 10 to 51 or more inches thick. The underlying layers of organic material, to a depth of 51 inches or more, consist of partially decom-

posed woody fragments, herbaceous material, and sphagnum peat.

Included with these soils in mapping are areas that have less than 51 inches of organic soil over mineral soils or bedrock. Also included are areas of Norwich soils and areas of organic soils that have unrubbed fiber content of more than two-thirds of the volume. The included areas in this unit are larger in size than included areas in most units in this survey.

These soils have a water table at or near the surface during most of the year. Bedrock is generally deeper than 5 feet. Reaction is extremely acid to strongly acid.

Most areas of these soils are in cattails, blueberry bushes, and sphagnum moss or are in black and red spruce and hemlock (fig. 13). These soils have poor potential for most uses. Wetland wildlife habitat is a potential use. Small areas of Medihemists that can be drained have potential as a source of commercial peat. Several areas have been used for this purpose. The seasonal water table and organic nature of these soils are limitations for most other uses.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

MrA—Morris channery loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained soil is on broad uplands. Slopes are generally plane. Areas of this soil are irregular in shape and range from about 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery loam about 10 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of 65 inches, is reddish brown and dark brown, very firm and brittle gravelly loam and gravelly silt loam.

Figure 13.—Typical area of Medisaprists and Medihemists. Some of these areas are drained and mined as sources of commercial peat.

Included with this soil in mapping are a few areas of Wellsboro, Norwich, Chippewa, and Volusia soils. Also included are scattered areas of soils that have a more clayey subsoil.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is slow. The subsoil has a fragipan at a depth of about 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are used for pasture or hay because of wetness. A few areas are in cultivated crops. This soil is suited to grass and pasture but can be used for cultivated crops if managed properly. It has good potential for trees. The seasonal high water table and slowly permeable subsoil limit this soil for many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is slight. The use of cover crops, crop residue, grasses and legumes in the cropping system, minimum tillage, and sod waterways help to reduce runoff and maintain the content of organic matter. Open and covered drains are needed to help remove excess water and to allow for timely tillage. The channery surface can interfere with the seeding and harvesting of some crops.

This Morris soil has good potential for pasture. Controlling grazing is the major concern of management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A small acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIw; woodland ordination symbol is 3w.

MrB—Morris channery loam, 3 to 8 percent slopes. This gently sloping, somewhat poorly drained soil is on broad rolling uplands. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 60 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery loam about 10 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of 65 inches, is reddish brown and dark brown, very firm and brittle gravelly loam and gravelly silt loam.

Included with this soil in mapping are a few areas of Wellsboro, Chippewa, and Volusia soils. Also included are scattered areas of soils that have a more clayey subsoil.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is medium. The subsoil has a fragipan at a depth of about 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are used for hay or pasture because of wetness. A few areas are used for cultivated crops. This soil is suited to grass and pasture but can be used for cultivated crops if properly managed. It has good potential for trees. The seasonal high water table and slowly permeable subsoil limit this soil for many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. The channery surface may interfere with the seeding and harvesting of some crops.

This Morris soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A small acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, roads should be constructed on the contour to reduce erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper

outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIw; woodland ordination symbol is 3w.

MrC—Morris channery loam, 8 to 18 percent slopes. This sloping, somewhat poorly drained soil is on side slopes of upland ridges and in seep areas on hillsides. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 40 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery loam about 10 inches thick. The upper part of the subsoil, to a depth of about 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of 65 inches, is reddish brown and dark brown, very firm and brittle gravelly loam and gravelly silt loam.

Included with this soil in mapping are a few areas of Wellsboro and Volusia soils and a few areas of Morris soils that have flagstones on the surface. Also included are scattered areas of Morris soils that are moderately steep.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is rapid. The subsoil has a fragipan at a depth of about 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are used for pasture or hay. A few areas are in cultivated crops. This soil is suited to grass and pasture but can be used for cultivated crops if properly managed. It has good potential for trees. The seasonal high water table, slowly permeable subsoil, and slope limit many nonfarm uses of this soil.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Morris soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A small acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, roads should be constructed on the contour to reduce erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability, slope, and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIe; woodland ordination symbol is 3w.

MsB—Morris flaggy loam, 3 to 8 percent slopes. This gently sloping, somewhat poorly drained soil is on broad level uplands. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 35 acres in size.

Typically, the surface layer of this soil is dark grayish brown flaggy loam about 10 inches thick. The upper part of the subsoil, to a depth of about 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of 65 inches, is reddish brown and dark brown, very firm and brittle channery loam and channery silt loam.

Included with this soil in mapping are a few areas of Wellsboro and Chippewa soils and a few areas of sloping Morris soils. Also included are scattered areas of nonflaggy Morris soils.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is medium. The subsoil has a fragipan at a depth of about 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are used for pasture or hay. A few areas are in cultivated crops. This soil is suited to grass and pasture but can be used for cultivated crops if properly managed. It has good potential for trees. The seasonal high water table, flaggy surface, and slowly permeable subsoil limit this soil for many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. Surface flagstones can interfere with seeding and harvesting of some crops.

This Morris soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, de-

ferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A medium acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, roads should be constructed on the contour to reduce erosion. Use of equipment is restrictd during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability and seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IVs; woodland ordination symbol is 3w.

MsC—Morris flaggy loam, 8 to 15 percent slopes. This sloping, somewhat poorly drained soil is on side slopes of rolling uplands and in seep areas on hillsides. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark grayish brown flaggy loam about 10 inches thick. The upper part of the subsoil, to a depth of about 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of about 65 inches, is reddish brown and dark brown, very firm and brittle channery loam and channery silt loam.

Included with this soil in mapping are a few areas of Wellsboro and Volusia soils and a few areas of gently sloping and steep Morris soils. Also included are scattered areas of nonflaggy Morris soils.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is rapid. The subsoil has a fragipan at a depth of about 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and the upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are used for pasture or hay. A few areas are in cultivated crops. This soil is suited to grass and pasture but can be used for crops if properly managed. It has good potential for trees. The seasonal high water table, surface flagstones, slowly permeable subsoil, and slope limit this soil for many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. Surface flagstones may interfere with seeding and harvesting of some crops.

This Morris soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A medium acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow permeability and seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IVs; woodland ordination symbol is 3w.

MxB—Morris extremely stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on broad upland ridges. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 100 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark grayish brown channery loam about 2 inches thick. The upper part of the subsoil, to a depth of about 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of about 65 inches, is reddish brown and dark brown, very firm and brittle channery loam and channery silt loam.

Included with this soil in mapping are a few areas of Wellsboro, Chippewa, and Volusia soils. Also included are scattered areas of nonstony Morris soils.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is slow to moderate. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are wooded. A few areas are in pasture. The soil is suited to woodland. Because of the extremely stony surface, the soil is not suited to cultivat-

ed crops and pasture. This soil has fair potential for trees. The seasonal high water table, surface stones, and slowly permeable subsoil limit this soil for many nonfarm uses.

This Morris soil is suited to trees. A large acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table.

This soil has limitations for most nonfarm uses. The slow permeability, surface stones, and a seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

MxD—Morris extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, somewhat poorly drained soil is on side slopes of upland ridges. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 5 to more than 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark grayish brown channery loam about 2 inches thick. The upper part of the subsoil, to a depth of about 15 inches, is dark brown channery loam. The lower part of the subsoil, to a depth of 65 inches, is reddish brown and dark brown, very firm and brittle channery loam and channery silt loam.

Included with this soil in mapping are a few areas of Wellsboro and Volusia soils and a few areas of nonstony Morris soils.

This soil is slowly permeable. Available water capacity is very low. Surface runoff is moderate to rapid. The subsoil has a fragipan at a depth of about 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are wooded. This soil is suited to woodland. It is not suited to cultivated crops and pasture because of the extremely stony surface and slope. It has fair potential for growing trees. The seasonal high water table, stony surface, slowly permeable subsoil, and slope limit this soil for most nonfarm uses.

This Morris soil is suited to trees. A large acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, roads should be constructed on the contour to reduce erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table.

This soil has limitations for most nonfarm uses. The slow permeability, surface stones, a seasonal high water table, and slope are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

NcA—Norwich and Chippewa channery silt loams, 0 to 3 percent slopes. These nearly level, very poorly drained and poorly drained soils are on flat to slightly concave, glaciated uplands. Areas of these soils are irregular in shape and generally range from 3 to 25 acres in size. These soils are not shown separately on the soil map because of their similarity in use and management and their adjacent position on the landscape. Individual areas can contain only the Norwich soil, only the Chippewa soil, or any combination of the two. Approximately 40 percent of the map unit is Norwich soil and 35 percent is Chippewa soil.

Typically, the surface layer of the Norwich soil is dark gray channery silt loam about 2 inches thick. The subsurface layer, to a depth of 4 inches, is gray channery silt loam. The upper part of the subsoil, to a depth of 12 inches, is gray, friable channery silt loam with a few strong brown mottles. The lower part of the subsoil, to a depth of 48 inches, is a fragipan. It is brown, very firm and firm, brittle channery silt loam with few to many dark gray, strong brown, and brown mottles. The substratum, to a depth of 65 inches, is reddish brown channery loam with distinct brown and gray mottles.

Typically, the surface layer of the Chippewa soil is dark grayish brown channery silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 12 inches, is light gray, friable channery silt loam with yellowish brown mottles. Below that, to a depth of 18 inches, is light gray, friable silt loam with yellowish brown mottles. The lower part of the subsoil, to a depth of 52 inches, is a fragipan. It is light gray and grayish brown, firm and very firm, brittle channery silt loam. The substratum to a depth of 60 inches is dark grayish brown, firm channery silt loam.

Included with these soils in mapping are some areas of Volusia and Morris soils, and small areas of soils that have an organic surface layer as much as 16 inches thick.

These soils have a fragipan at a depth of 10 to 20 inches and are slowly and very slowly permeable (fig. 14). Available water capacity is very low to low for the Chippewa soil and very low for the Norwich soil. Reaction is strongly acid or medium acid throughout the profile of the Norwich soil. It is very strongly acid to slightly

acid in the surface layer and upper part of the subsoil of the Chippewa soil and strongly acid to slightly acid in the lower part of the subsoil. These soils have channers on the surface. They have a water table at or near the surface for most of the year. Surface runoff is very slow to ponded. Rooting depth is restricted by the fragipan and the high water table.

These soils are mostly used for woodland, but they are poorly suited to trees. They have poor potential for cultivated crops and fair potential for pasture. Potential for most nonfarm uses is poor.

These soils are not generally used for cultivated crops because of the high water table. With adequate drainage, however, they may be used occasionally for row crops. Keeping drainageways open helps to remove excess surface water. Drainage may be improved by surface and subsurface drains where outlets are available.

These soils have fair potential for pasture. Controlling grazing is the major concern in management. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

These soils are poorly suited to woodland; however, most of the acreage is wooded. Productivity is low because the rooting depth is restricted by the fragipan and the high water table. Removal of undesirable species helps to increase production. Use of equipment is restricted for long periods during the year because of the high water table.

These soils have limitations for most nonfarm uses, including onsite waste disposal, because of the high water table and slow to very slow permeability.

This map unit is in capability subclass IVw; woodland ordination symbol is 5w.

Figure 14.—Recreation pond in an area of Norwich and Chippewa channery silt loams, 0 to 3 percent slopes.

NcB—Norwich and Chippewa channery silt loams, 3 to 8 percent slopes. These gently sloping, very poorly drained and poorly drained soils are on slightly concave glaciated uplands. Areas of these soils are irregular in shape and generally range from 5 to 50 acres in size. These soils are not shown separately on the soil map because of their similarity in use and management and their adjacent position on the landscape. Individual areas can contain only the Norwich soil, only the Chippewa soil, or a combination of both soils. The map unit is about 40 percent Norwich soil and 35 percent Chippewa soil.

Typically, the surface layer of the Norwich soil is dark gray channery silt loam about 2 inches thick. The subsurface layer is gray channery silt loam 2 inches thick. The upper part of the subsoil, to a depth of 12 inches, is gray, friable channery silt loam with few strong brown mottles. The lower part of the subsoil, to a depth of 48 inches, is brown, very firm and firm, brittle channery silt loam with few to many dark gray and strong brown and brown mottles. The substratum, to a depth of 65 inches, is reddish brown channery loam with distinct brown and gray mottles.

Typically, the surface layer of the Chippewa soil is dark grayish brown channery silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 12 inches, is light gray, friable channery silt loam with yellowish brown mottles. The middle part, to a depth of 18 inches, is light gray, friable silt loam with yellowish brown mottles. The lower part, to a depth of 52 inches, is light gray and grayish brown, firm and very firm, brittle channery silt loam. The substratum, to a depth of 60 inches, is dark grayish brown, firm channery silt loam.

Included with these soils in mapping are some areas of Volusia and Morris soils.

These soils have a fragipan at a depth of 10 to 20 inches. They are slowly and very slowly permeable. Available water capacity is low to very low in the Chippewa soil and very low in the Norwich soil. Reaction is strongly acid or medium acid in the Norwich soil and very strongly acid to slightly acid in the upper part of the solum of the Chippewa soil and strongly acid to slightly acid in the lower part. These soils have a high water table at or near the surface during most of the year. Surface runoff is very slow. Rooting depth is restricted by the fragipan and the high water table.

These Norwich and Chippewa soils are mostly used for woodland. They are too wet for crops or good pasture. They are poorly suited to trees. These soils have

poor potential for most nonfarm uses because of the seasonal high water table and slow and very slow permeability.

These soils are not generally used for cultivated crops because of the high water table. With adequate drainage, however, they may be used occasionally for row crops. Keeping natural drainageways open helps to remove excess surface water. Drainage may be improved by surface and subsurface drains where adequate outlets are available.

These soils have fair potential for pasture. Controlling grazing is the major concern in management. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

These soils are poorly suited to trees; however, most of the acreage is wooded. Productivity is low because the rooting depth is restricted by the fragipan and the high water table. Removal of undesirable species helps to increase production. Use of equipment is restricted for long periods during the year because of the high water table.

These soils have limitations for most nonfarm uses, including onsite waste disposal, because of the high water table and slow to very slow permeability.

This map unit is in capability subclass IVw; woodland ordination symbol is 5w.

NxB—Norwich and Chippewa extremely stony silt loams, 0 to 8 percent slopes. These nearly level and gently sloping soils are on flat to slightly concave glaciated uplands. Areas of these soils are irregular in shape and generally range from 5 to 50 acres in size. Stones cover about 15 to 30 percent of the surface. These soils are not shown separately on the soil map because of their similarity in use and management and their adjacent position on the landscape. Individual areas can contain only the Norwich soil, only the Chippewa soil, or a combination of both soils. The map unit is about 40 percent Norwich soil and 35 percent Chippewa soil.

Typically, the surface layer of the Norwich soil is dark gray channery silt loam about 2 inches thick. The subsurface layer is gray channery silt loam 2 inches thick. The upper part of the subsoil, to a depth of 12 inches, is gray, friable channery silt loam with a few strong brown mottles. The lower part, to a depth of 48 inches, is brown, very firm and firm channery silt loam with few to many dark gray and strong brown and brown mottles. The substratum, to a depth of 65 inches, is reddish brown channery loam with distinct brown and gray mottles.

Typically, the surface layer of the Chippewa soil is grayish brown channery silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 12 inches, is light gray, friable channery silt loam with yellowish brown mottles. The middle part, to a depth of 18 inches, is light gray, friable silt loam with yellowish brown mottles. The lower part, to a depth of 52 inches is light gray and grayish brown, firm and very firm, brittle channery silt loam. The substratum to a depth of 60 inches is dark grayish brown, firm channery silt loam.

Included with these soils in mapping are some areas of Volusia and Morris soils and small areas of soils that have an organic surface layer as much as 16 inches thick.

These soils have a fragipan at a depth of 10 to 20 inches. They are slowly and very slowly permeable. The available water capacity is low to very low in the Chippewa soil and very low in the Norwich soil. Reaction is strongly acid or medium acid throughout in the Norwich soil. It is very strongly acid to slightly acid in the surface layer and upper part of the subsoil in the Chippewa soil and strongly acid to slightly acid in the lower part. These soils have numerous large stones on the surface, and they have a high water table at or near the surface during most of the year. Surface runoff is very slow to ponded. Rooting depth is restricted by the fragipan and the high water table.

Most areas of these soils are in woodland. These soils are too stony and too wet for cultivated crops or pasture. They are poorly suited to trees. The potential for most nonfarm uses is poor.

These soils are not used for cultivated crops or for pasture because of the high water table and surface stones. Removing surface stones and trees and lowering the water table for cultivated crops or pasture are not feasible because of the expense involved.

These soils are not suited to trees; however, most of the acreage is wooded. Productivity is low. The rooting depth is restricted by the fragipan and the high water table. Removal of undesirable species is a management practice that helps to increase production. Use of equipment is restricted for long periods during the year because of the high water table. Large surface stones interfere with the harvesting and planting of trees.

These soils have limitations for most nonfarm uses, including onsite waste disposal, because of the high water table, slow permeability, and extremely stony surface.

This map unit is in capability subclass VIIs; woodland ordination symbol is 5x.

OcB—Oquaga channery loam, 3 to 8 percent slopes. This gently sloping, moderately deep, somewhat excessively drained soil is on ridgetops and on broad level areas on mountaintops and hillside benches. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 5 to 35 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsoil is reddish brown channery loam to a depth of 15 inches. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, and Lackawanna soils.

This soil is moderately permeable. Available water capacity is very low to moderate. Where unlimed, this soil is very strongly acid to medium acid throughout. Surface runoff is medium. Rooting depth is restricted by bedrock.

This Oquaga soil has fair potential for cultivated crops, and many areas are used for crops. It has fair potential for pasture and good potential for woodland.

If cultivated crops are grown, the hazard of erosion is moderate. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grass and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A medium acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for many nonfarm uses, including onsite waste disposal, because of the depth to bedrock. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIe; woodland ordination symbol is 3f.

OcC—Oquaga channery loam, 8 to 15 percent slopes. This sloping, moderately deep, somewhat excessively drained soil is on side slopes of broad upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 5 to 25 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsoil is reddish brown channery loam to a depth of 15 inches. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, and Lackawanna soils.

This soil is moderately permeable. Available water capacity is very low to moderate. Where unlimed, this soil is very strongly acid to medium acid throughout. Surface runoff is rapid. Rooting depth can be restricted by bedrock.

This Oquaga soil has fair potential for cultivated crops and is mostly used for hay. Small areas are cultivated. This soil has fair potential for pasture and good potential for woodland.

If cultivated crops are grown, the hazard of erosion is severe. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grass and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of this soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A moderate acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for nonfarm uses, including onsite waste disposal, because of the depth to bedrock and slope. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIIe; woodland ordination symbol is 3f.

OcD—Oquaga channery loam, 15 to 25 percent slopes. This moderately steep, moderately deep, somewhat excessively drained soil is on side slopes of broad upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 5 to 20 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsoil is reddish brown channery loam to a depth of 15 inches. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, and Lackawanna soils.

This soil is moderately permeable. Available water capacity is very low to moderate. Where unlimed, this soil is very strongly acid to medium acid throughout. Surface runoff is rapid. Rooting depth is restricted by bedrock.

This Oquaga soil has fair potential for cultivated crops and is mostly used for pasture or woodland. It has fair potential for pasture and good potential for woodland.

If cultivated crops are grown, the hazard of erosion is very severe. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grass and legumes in the

cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A large acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting of large areas is generally practical.

This soil has limitations for most nonfarm uses, including onsite waste disposal, because of the depth to bedrock and slope. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVe; woodland ordination symbol is 3r.

OfB—Oquaga flaggy loam, 3 to 8 percent slopes. This gently sloping, moderately deep, somewhat excessively drained soil is on broad upland ridgetops. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 30 acres in size.

Typically, the surface layer of this soil is dark reddish brown flaggy loam about 2 inches thick. The subsoil, to a depth of 15 inches, is reddish brown flaggy loam. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, Lackawanna, and nonflaggy Oquaga soils.

This soil is moderately permeable. Available water capacity is very low to moderate. Where unlimed, this soil is very strongly acid to medium acid throughout. Surface runoff is medium. Rooting depth is restricted by bedrock.

This Oquaga soil has fair potential for cultivated crops, and most areas are used for pasture and hay. Small areas are cultivated. This soil has good potential for pasture and for woodland.

If cultivated crops are grown, the hazard of erosion is moderate. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grass and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil. Surface flagstones interfere with seeding and harvesting of most crops.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A large acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of the depth to bedrock and surface flagstones. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is capability subclass IIIs; woodland ordination symbol is 3f.

OfC—Oquaga flaggy loam, 8 to 15 percent slopes. This sloping, moderately deep, somewhat excessively drained soil is on side slopes of upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 25 acres in size.

Typically, the surface layer of this soil is dark reddish brown flaggy loam about 2 inches thick. The subsoil, to a depth of 15 inches, is reddish brown flaggy loam. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, Lackawanna, and nonflaggy Oquaga soils.

This soil is moderately permeable. Available water capacity is very low to moderate. Where unlimed, this soil is very strongly acid to medium acid throughout. Surface runoff is medium. Rooting depth is restricted by bedrock.

This Oquaga soil has poor potential for cultivated crops, and most areas are used for pasture and hay. Small areas are cultivated. This soil has good potential for pasture and for woodland.

If cultivated crops are grown, the hazard of erosion is severe. Further erosion causes a shallower rooting depth and lower available water capacity for plants. The use of cover crops, including grass and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating some crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting. Surface flagstones interfere with the seeding and harvesting of crops.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of

pasture are the chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

A large acreage of this soil is wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. Machine planting of large areas is generally practical.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of the depth to bedrock and surface flagstones. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVs; woodland ordination symbol is 3f.

OxB—Oquaga extremely stony loam, 3 to 8 percent slopes. This gently sloping, moderately deep, somewhat excessively drained soil is on ridgetops and broad level mountaintops and hillside benches. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 60 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsoil, to a depth of 15 inches, is reddish brown channery loam. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, Lackawanna, and nonstony Oquaga soils.

This soil is moderately permeable. Available water capacity is very low to moderate. This soil is very strongly acid to medium acid throughout. Surface runoff is medium. Rooting depth can be restricted by bedrock.

This Oquaga soil has poor potential for cultivated crops and pasture because of numerous surface stones. Removing the surface stones for these uses is not feasible. This soil has fair potential for woodland.

Almost all areas of this soil are wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. Machine planting of areas is generally not practical because of surface stones.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of the depth to bedrock and numerous surface stones. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

OxD—Oquaga extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, somewhat excessively drained soil is on side slopes of upland ridges and mountainsides. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 80 acres. Stones cover about 3 to 30 percent of the surface.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsoil, to a depth of 15 inches, is reddish brown channery loam. The substratum is reddish brown very channery sandy loam. Dusky red sandstone and shale bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of Arnot, Lordstown, Lackawanna, and nonstony Oquaga soils.

This soil is moderately permeable. Available water capacity is very low to moderate. This soil is very strongly acid to medium acid throughout. Surface runoff is medium to rapid. Rooting depth can be restricted by bedrock.

This soil has poor potential for cultivated crops and pasture because of numerous surface stones. It is used mainly for woodland, for which it has fair potential.

This soil is not suited to cultivated crops and pasture because of the numerous surface stones. Removing the surface stones for these uses is not feasible.

Almost all areas of this soil are wooded. Productivity is moderately high, but rooting depth can be restricted by bedrock. A management hazard is moderate seedling mortality because of the very low to moderate available water capacity. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting of areas is generally not practical because of stones.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of the depth to bedrock, slope, and surface stones. If this soil is disturbed for construction, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol 3x.

OYE—Oquaga and Lordstown extremely stony loams, steep. These steep, moderately deep, somewhat excessively drained and well drained soils are on mountainsides. Areas of these soils are generally long and narrow to broad in shape and range from about 5 to more than 100 acres in size. Stones cover about 15 to 30 percent of the surface. Because of numerous surface stones and steep slopes, showing these soils separately on the soil map is not practical or necessary. Individual areas may contain only the Oquaga soil, only the Lordstown soil, or a combination of both soils. The map unit is about 45 percent Oquaga soils and 20 percent Lordstown soils. Slopes range from 25 to 70 percent.

Typically, the surface layer of the Oquaga soil is dark reddish brown channery loam about 2 inches thick. The subsoil, to a depth of 15 inches, is reddish brown chan-

nery loam. The substratum is reddish brown very channery sandy loam. Dusky red sandstone bedrock is at a depth of 25 inches.

Typically, the Lordstown soil is very dark grayish brown channery silt loam about 2 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brownish yellow channery silt loam. The lower part of the subsoil, to a depth of 20 inches, is brown very shaly silt loam. Olive gray shale bedrock is at a depth of 26 inches.

Included with these soils in mapping are large areas of Lackawanna, Bath, and Arnot soils. The included areas in this map unit are generally larger than areas included in less steep map units in the survey.

These soils are moderately permeable. Available water capacity is very low to moderate in the Oquaga soil and low to moderate in the Lordstown soil. Rooting depth can be restricted by bedrock, which is at a depth of 20 to 40 inches. These soils are very strongly acid to medium acid throughout.

Most areas of these soils are in woodland. Productivity is moderately high. These soils are fairly suited to trees. They are too steep and stony for cultivated crops and pasture. Management and harvesting of trees are limited because of the extremely stony surface and steep slopes. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion.

Surface stones and steep slopes are limitations to most nonfarm uses of these soils.

This map unit is in capability subclass VIIs; woodland ordination symbol is 3x.

Ph—Philo silt loam. This nearly level, deep, moderately well drained soil is on flood plains. Areas of this soil are long and narrow in shape and are mainly 3 to 75 acres in size.

Typically, the surface layer of this soil is brown silt loam 8 inches thick. The upper part of the subsoil, to a depth of 13 inches, is dark brown silt loam; the middle part, to a depth of 22 inches, is dark brown loam with faint mottles; and the lower part, to a depth of 32 inches, is dark brown loam with distinct mottles. The upper part of the substratum, to a depth of 44 inches, is dark grayish brown loam with distinct mottles. To a depth of 60 inches, the substratum is dark gray silt loam with distinct and faint mottles.

Included with this soil in mapping are a few small areas of Pope soils; Pope soils, rarely flooded; and Holly soils. Also included are small, scattered areas of gravelly soils.

This soil has moderately slow and moderate permeability. Available water capacity is moderate and high. Surface runoff is slow. The surface layer has less than 10 percent coarse fragments. The soil has a seasonal high water table at a depth of 18 to 36 inches. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated. Small areas are used for pasture or woodland. This soil has good potential for cultivated crops. It is well suited to pasture and trees.

If cultivated crops are grown, open and closed drains may be needed to help remove excess water and to allow for timely tillage. Damage to crops and soil erosion or deposition may result from floodwater. The use of cover crops and including grasses and legumes in the cropping system help to maintain the content of organic matter and good tilth.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Philo soil is suited to trees, but only a small acreage is wooded. Productivity is high. Management hazards are slight. Machine planting of large areas is practical.

This soil has limitations for most nonfarm uses, especially homesites, because of flooding and the seasonal high water table.

This soil is in capability subclass IIw; woodland ordination symbol is 2w.

Pk—Pits, gravel. This map unit consists of excavated areas that have been mined for sand and gravel. These areas generally are on river and stream terraces. Spoil piles of cobbles and boulders that have been screened out are common. Slopes range from 0 to 80 percent within short distances. In some areas the water table is at or near the top of the pits.

Little or no vegetation exists in these areas except in included areas of spoil that contains fine soil material. The material on the bottom and sides of the pits consists of sand and gravel and has little or no fine soil material.

Most areas of this map unit are idle. A few have been used as landfills. The depth to the water table, slope, and rapid permeability are limitations for most uses. Some areas have been reclaimed by leveling and filling. Some reclaimed areas have been used as building sites.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

Po—Pope soils. These nearly level, deep, well drained soils are on flood plains. Areas of these soils are long and narrow in shape and are mainly 3 to 35 acres in size.

Typically, the surface of these soils is dark brown fine sandy loam 11 inches thick. The upper part of the subsoil, to a depth of 16 inches, is yellowish brown fine sandy loam. The lower part of the subsoil, to a depth of 37 inches, is yellowish brown sandy loam. The substratum, to a depth of 60 inches, is dark yellowish brown

loamy sand. In places the surface layer is silt loam, fine sandy loam, or loam. An individual area can be predominantly one texture, or can be all of these textures.

Included with these soils in mapping are a few small areas of Philo silt loam and Pope soils, rarely flooded. Also included are small, scattered areas of gravelly soils.

These soils are moderately permeable and moderately rapidly permeable. Available water capacity is moderate and high. Surface runoff is slow. The surface layer has less than 10 percent coarse fragments. Where unlimed, these soils are very strongly acid or strongly acid.

Most areas of these soils are cultivated. Small areas are used for pasture or woodland. These soils have excellent potential for cultivated crops, and they are well suited to pasture and trees.

If cultivated crops are grown, soil erosion or deposition and crop damage may result from floodwater. The use of cover crops, crop residue, and including grasses and legumes in the cropping system help to maintain the content of organic matter and good tilth.

When these soils are used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

These Pope soils are suited to trees, but only a small acreage is wooded. Productivity is high. Management hazards are slight. Machine planting of large areas is practical.

This soil has limitations for some nonfarm uses, including homesites and onsite waste disposal, because of occasional flooding.

These soils are in capability class I; woodland ordination symbol is 2o.

Pp—Pope soils, rarely flooded. These nearly level, deep, well drained soils are on high flood plains. Flooding is rare but possible under extreme conditions. Areas of these soils are long and narrow in shape and are mainly 5 to 100 acres in size.

Typically, the surface layer of these soils is dark brown fine sandy loam 11 inches thick. The upper part of the subsoil, to a depth of 16 inches, is yellowish brown fine sandy loam. The lower part of the subsoil, to a depth of 37 inches, is yellowish brown sandy loam. The substratum, to a depth of 60 inches, is dark yellowish brown loamy sand. The surface layer in places is silt loam, fine sandy loam, or loam. Individual areas can be predominantly only one texture or can be all of these textures.

Included with these soils in mapping are a few small areas of Philo silt loam and Pope soils that have an occasional flooding hazard. Also included are small, scattered areas of gravelly soils.

These soils are moderately permeable and moderately rapidly permeable. Available water capacity is moderate to high. Surface runoff is slow. The surface layer of these soils has less than 10 percent coarse fragments. Where unlimed, these soils are very strongly acid or strongly acid.

Most areas of these soils are cultivated. Small areas are used for building sites. These soils have excellent potential for cultivated crops, pasture, and trees. They are suited to most nonfarm uses.

If cultivated crops are grown, the hazard of erosion or deposition from floodwater is rare. The use of cover crops, crop residue, and including grasses and legumes in the cropping system help to maintain the content of organic matter and good tilth.

When these soils are used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

These Pope soils are suited to trees, but only a small acreage is wooded. Productivity is high. Management hazards are slight. Machine planting of the large areas is practical.

This soil has few limitations for most nonfarm uses. Rare flooding is a limitation for homesites and onsite waste disposal.

These soils are in capability class I; woodland ordination symbol is 2o.

Qu—Quarries. This map unit consists of excavated areas that have been mined for flagstones. These areas generally are on the sides and tops of upland ridges that are associated with the Arnot and Lordstown soils. Slopes are nearly level to vertical.

The bottom and sides of the quarries are made up of exposed bedrock. Spoil piles of broken flagstones are common. The rock layers are generally uniform in thickness and are relatively horizontal. Little or no vegetation grows here. The bottom of the quarry is generally excavated in steps or different levels. The walls of the quarry are generally vertical.

After mining is completed, these areas are generally left idle. Very few areas have been reclaimed. The lack of soil material and the difficulty in excavation prevent reclamation.

These areas have poor potential for most uses because of exposed bedrock, the high percentage of coarse fragments, and very low available water capacity.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

ReA—Rexford loam, 0 to 5 percent slopes. This nearly level, somewhat poorly drained and poorly drained soil is on nearly level outwash terraces. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 15 acres in size.

Typically, the surface layer of this soil is dark grayish brown loam about 9 inches thick. The upper part of the subsoil, to a depth of 21 inches, is slightly firm, dark yellowish brown gravelly loam and light brownish gray

fine sandy loam. The lower part of the subsoil, to a depth of 40 inches, is firm, light brownish gray loam and dark brown fine sandy loam. The substratum, to a depth of 60 inches, is brown loamy fine sand.

Included with this soil in mapping are a few areas of Atherton and Braceville soils. Also included are scattered areas of soils that are similar to this Rexford soil but have a friable subsoil.

This soil is slowly permeable. Available water capacity is low to moderate. Surface runoff is slow to medium. The subsoil has a fragipan at a depth of 15 to 24 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is strongly acid and medium acid throughout.

Most areas of this soil are used for hay or pasture. A few areas are cultivated. This soil is best suited to grass and pasture but can be used for crops if properly managed. It has good potential for trees.

If cultivated crops are grown, open and closed drains or diversions are needed to help remove excess water and to allow for timely tillage. The seasonal high water table may interfere with the seeding and harvesting of crops. The hazard of erosion is moderate where slopes exceed 3 percent. The use of contour stripcropping, minimum tillage, sod waterways, cover crops, and including grasses and legumes in the cropping system help to reduce runoff and control erosion.

This Rexford soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A small acreage is wooded, and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses because of slow permeability and the seasonal high water table. The slow permeability and seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIw; woodland ordination symbol is 3w.

SwB—Swartswood channery loam, 3 to 8 percent slopes. This gently sloping soil is on broad upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 20 acres in size.

Typically, the surface layer of this soil is dark brown channery loam about 9 inches thick. The subsoil is about 47 inches thick. The upper 15 inches of the subsoil is dark brown channery sandy loam. Below that, to a depth of 38 inches, is dark brown, firm and brittle gravelly loam. The lower part of the subsoil, to a depth of 56 inches, is dark yellowish brown, firm and brittle gravelly sandy loam. The substratum, to a depth of 65 inches, is dark yellowish brown gravelly sandy loam.

Included with this soil in mapping are small areas of Wurtsboro and Bath soils. Also included are a few small areas of sloping Swartswood soils.

This soil has a fragipan at a depth of 22 to 36 inches. It is moderately slowly or slowly permeable. Available water capacity is very low to low. Where unlimed, this soil is very strongly acid or strongly acid. The soil is well drained but may temporarily have a perched water table during wet seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan.

Most areas of this soil are used for cultivated crops. Small areas are used for building sites. The soil has good potential for cultivated crops and is well suited to pasture and trees. The potential for homesites is good, but potential for onsite waste disposal is poor because of moderately slow or slow permeability in the subsoil.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are the chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Swartswood soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Machine planting of the large areas is practical.

The moderately slow or slow permeability in the subsoil is a limitation for most nonfarm uses, including onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIs; woodland ordination symbol is 3o.

SwC—Swartswood channery loam, 8 to 15 percent slopes. This sloping soil is on side slopes of upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and generally range from 3 to 25 acres in size.

Typically, the surface layer of this soil is dark brown channery loam about 9 inches thick. The subsoil is about 47 inches thick. The upper 15 inches of the subsoil is dark brown channery sandy loam. Below that, to a depth of 38 inches, is dark brown, firm and brittle gravelly loam. The lower part of the subsoil is dark yellowish brown, firm and brittle gravelly sandy loam. The substratum, to a depth of 65 inches, is dark yellowish brown sandy loam.

Included with this soil in mapping are small areas of Wurtsboro and Bath soils. Also included are a few small areas of moderately steep Swartswood soils.

This soil has a fragipan at a depth of 22 to 36 inches. It is moderately slowly or slowly permeable. Available water capacity is very low to low. Where unlimed, this soil is very strongly acid or strongly acid. The soil is well drained but may temporarily have a perched water table during wet seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan.

Most areas of this soil are used for cultivated crops or hay. Small areas are used for building sites. The soil has good potential for cultivated crops, and is well suited to pasture and trees. The potential for homesites is good, but potential for onsite waste disposal is poor because of moderately slow or slow permeability in the subsoil.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating crop residue into the surface helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Swartswood soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Machine planting of the large areas is practical.

The moderately slow to slow permeability in the subsoil and slope are limitations for many nonfarm uses, including onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIIe; woodland ordination symbol is 3o.

SwD—Swartswood channery loam, 15 to 25 percent slopes. This moderately steep soil is on side slopes of upland ridges. Slopes are convex to rolling. Areas of this soil are irregular in shape and generally range from 3 to 15 acres in size.

Typically, the surface layer of this soil is dark brown channery loam about 4 inches thick. The subsoil is about 52 inches thick. The upper 3 inches of the subsoil is yellowish brown channery loam; the next 31 inches is 17 inches of dark brown channery sandy loam over 14 inches of dark brown, firm and brittle gravelly loam; and the lower part of the subsoil, to a depth of 56 inches, is dark yellowish brown, firm and brittle gravelly sandy loam. The substratum, to a depth of 65 inches, is dark yellowish brown gravelly sandy loam.

Included with this soil in mapping are small areas of Wurtsboro and Bath soils. Also included are a few small areas of Swartswood extremely stony loam.

This soil has a fragipan at a depth of 22 to 36 inches. It is moderately slowly or slowly permeable. Available water capacity is very low to low. Where unlimed, this soil is very strongly acid or strongly acid. The soil is well drained but may temporarily have a perched water table during wet seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan.

Most areas of this soil are used for pasture, hay, or woodland. Small areas are used for cultivated crops and building sites. The soil has fair potential for cultivated crops and is well suited to pasture and trees. The potential for many nonfarm uses is poor because of slope and the moderately slow or slow permeability.

If cultivated crops are grown, the hazard of erosion is very severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. If the topography is suitable, stripcropping can also be used. Incorporating some crop residue into the surface layer helps to maintain the content of organic matter and to reduce clodding and crusting of the soil.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Swartswood soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting of the large areas is practical.

Slope and the moderately slow or slow permeability are limitations for many nonfarm uses. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass IVe; woodland ordination symbol is 3r.

SxB—Swartswood extremely stony loam, 3 to 8 percent slopes. This gently sloping soil is on broad upland ridges. Slopes are slightly convex to undulating. Areas of this soil are irregular in shape and generally range from 5 to 20 acres in size. Stones cover 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark brown channery loam about 4 inches thick. The subsoil is about 52 inches thick. The upper 3 inches of the subsoil is yellowish brown channery loam; the next 31 inches is 17 inches of dark brown channery sandy loam over 14 inches of dark brown, firm and brittle gravelly loam; and the lower part, to a depth of 56 inches is dark yellowish brown, firm and brittle gravelly sandy loam. The substratum, to a depth of 65 inches, is dark yellowish brown gravelly sandy loam.

Included with this soil in mapping are small areas of Wurtsboro and Bath soils. Also included are a few small areas of nonstony Swartswood soils.

This soil has a fragipan at a depth of 22 to 36 inches. It is moderately slowly or slowly permeable. Available water capacity is very low to low. This soil is very strongly acid or strongly acid. The soil is well drained but may temporarily have a perched water table during wet seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan.

Most areas of this soil are used for woodland because of numerous surface stones. Small areas are cleared of stones and used for building sites. The soil has poor potential for farming because of numerous surface stones but is well suited to trees.

This Swartswood soil is suited to trees, and a large acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. Machine planting is not practical because of large stones.

The large stones on the surface and the moderately slow or slow permeability in the subsoil are limitations for most nonfarm uses, including onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

SxD—Swartswood extremely stony loam, 8 to 25 percent slopes. This sloping to moderately steep soil is on side slopes of broad upland ridges. Slopes are convex. Areas of this soil are irregular in shape and generally range from 5 to 30 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark brown channery loam about 4 inches thick. The subsoil is about 52 inches thick. The upper 3 inches of the subsoil is yellowish brown channery loam; the next 31 inches is 17 inches of dark brown channery sandy loam over 14 inches of dark brown, firm and brittle gravelly loam; and the lower part to a depth of 56 inches is dark yellowish brown, firm and brittle gravelly sandy loam. The substratum, to a depth of 65 inches, is dark yellowish brown sandy loam.

Included with this soil in mapping are small areas of Wurtsboro and Bath soils. Also included are a few small areas of nonstony Swartswood soils.

This soil has a fragipan at a depth of 22 to 36 inches. It is moderately slowly or slowly permeable. Available water capacity is very low to low. This soil is very strongly acid or strongly acid. The soil is well drained but may temporarily have a perched water table during wet seasons. Surface runoff is medium to rapid. Rooting depth is restricted by the fragipan.

Most areas of this soil are used for woodland because of numerous surface stones. The soil has poor potential for farming because of surface stones but is well suited to trees. The potential for most nonfarm uses is poor.

This Swartswood soil is suited to trees, and a large acreage is wooded. Productivity is moderately high, but rooting depth can be restricted by the fragipan. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting is not practical because of the large stones.

The stones on the surface, moderately slow or slow permeability in the subsoil, and slope are limitations for most nonfarm uses, including onsite waste disposal. During construction on this soil, management practices are needed in places to control erosion and sediment.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

UA—Udorthents, strip mine. These nearly level to steep, deep, somewhat poorly drained to well drained soils are on upland ridges and side slopes. Areas of these soils are irregular in shape and range from about 3 to more than 200 acres in size. These soils are in areas that have been strip mined.

The surface layer of Udorthents is very channery or channery silt loam or loam as much as 4 inches thick. The substratum is very channery or channery loam or silt loam. Rock fragments make up 15 to 50 percent of individual horizons.

Included with Udorthents in mapping are areas of Wellsboro, Morris, and Arnot soils and areas of Urban land and Dumps, mine. The included areas may be larger than those included in most other map units in this survey.

These soils are moderately rapidly to slowly permeable. Available water capacity is moderate. Bedrock is generally below a depth of 4 feet. Reaction is extremely acid to medium acid throughout.

Most areas of these soils are idle. Some areas have been leveled and are used for building sites. Vegetation consists mostly of aspen and birch trees. These soils have poor potential for most uses because of the steep slopes, seasonal high water table, and variability of the soil material. The cost of reclaiming many of these areas is very high because of the irregular and steep slopes.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

UnB—Unadilla silt loam, 3 to 8 percent slopes. This undulating, deep, well drained soil is on high river ter-

races. Areas of this soil are irregular in shape and range from 3 to more than 20 acres in size.

Typically, the surface layer of this soil is dark brown silt loam 8 inches thick. The upper part of the subsoil, to a depth of 14 inches, is dark yellowish brown silt loam. The lower part of the subsoil, to a depth of 33 inches, is dark brown silt loam. The substratum, to a depth of 60 inches, is yellowish brown and dark brown very fine sandy loam.

Included with this soil in mapping are a few small areas of Wyoming soils and soils that are similar to this Unadilla soil but are less than 40 inches to stratified gravel. Also included are small, scattered areas of moderately well drained soils.

This soil is moderately permeable. Available water capacity is high. Surface runoff is medium. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated. Small areas are used for building sites. This soil has good potential for cultivated crops, and it is well suited to pasture and trees. The potential for homesites and for most other nonfarm uses is good.

If cultivated crops are grown, the hazard of erosion is moderate. Crops respond well to fertility and good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. The use of cover crops, crop residue, and including grasses and legumes in the cropping system help to maintain the content of organic matter and good tilth.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Unadilla soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high. Management hazards are slight. Machine planting of the large areas is practical.

This soil has few limitations for nonfarm uses. When this soil is used for construction, conservation practices are needed in places to control erosion and sediment.

This soil is in capability subclass IIe; woodland ordination symbol is 3o.

UnC—Unadilla silt loam, 8 to 15 percent slopes. This rolling, deep, well drained soil is on high river terraces. Areas of this soil are irregular in shape and range from 3 to more than 20 acres in size.

Typically, the surface layer of this soil is dark brown silt loam 8 inches thick. The upper part of the subsoil, to a depth of 14 inches, is dark yellowish brown silt loam. The lower part of the subsoil, to a depth of 33 inches, is dark brown silt loam. The substratum, to a depth of 60 inches, is yellowish brown and dark brown very fine sandy loam.

Included with this soil in mapping are a few small areas of Wyoming soils and areas of Unadilla soils on steeper slopes. Also included are small, scattered areas of soils that are similar to this Unadilla soil but are less than 40 inches to stratified gravel.

This soil is moderately permeable. Available water capacity is high. Surface runoff is medium. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated. Small areas are used for hay or pasture. This soil has good potential for cultivated crops, and it is well suited to pasture and trees.

If cultivated crops are grown, the hazard of erosion is severe. Crops respond well to fertility and good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. The use of cover crops, crop residue, and including hay in the cropping system help to maintain the content of organic matter and good tilth.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Unadilla soil is suited to trees, but only a small acreage is wooded. Productivity is moderately high. Management hazards are slight. Machine planting of the large areas is practical. During harvesting, roads should be constructed on the contour to reduce erosion.

Slope is a limitation for many nonfarm uses; frost action is a limitation for some uses. When this soil is used for construction, conservation practices are needed in places to control erosion and reduce sediment.

This soil is in capability subclass IIIe; woodland ordination symbol is 3r.

Ur—Urban land. This nearly level to moderately steep miscellaneous area occurs on broad upland ridges. Slopes generally have been smoothed and range from 0 to 25 percent. Areas generally range from about 10 to more than 500 acres in size.

The soil is so obscured by buildings, roads, and other structures in areas of Urban land that identification of the natural soil is not practical. Most areas of this unit are on upland glacial till soils.

Included with Urban land in mapping are small areas of Udorthents, strip mine and areas of Dumps, mine and Dumps, burned mine. Also included are small areas of Urban land, occasionally flooded.

The soil properties of this map unit are highly variable because of the many kinds of soils in these areas and the amount of alteration during construction. Onsite investigation is necessary to determine soil properties and potentials of a particular area.

No capability subclass or woodland ordination has been assigned to this map unit.

Us—Urban land, occasionally flooded. This nearly level miscellaneous area occurs on flat or slightly con-

cave flood plains. Areas are generally long and narrow and range from about 5 to more than 20 acres in size. Slopes range from 0 to 3 percent.

Urban land, occasionally flooded, is along streams and rivers. The soil is so obscured by buildings, roads, and other structures in areas of this unit that identification of the natural soil is not feasible.

Included with this unit in mapping are small areas of Urban land, Pope soils, and mine dumps.

The soil properties of this map unit and flooding frequency are variable. Onsite investigation is necessary to determine soil properties and potentials.

No capability subclass or woodland ordination symbol has been assigned to this map unit.

VcA—Volusia channery silt loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained soil is on broad uplands. Slopes are generally uniform and flat. Areas of this soil are irregular in shape and range from about 3 to 30 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 24 inches, is mottled, dark grayish brown and brown, firm and brittle channery loam; and the lower part, to a depth of 60 inches, is mottled brown, very firm and firm, brittle channery loam.

Included with this soil in mapping are a few areas of Chippewa, Morris, and Mardin soils and a few areas of gently sloping Volusia soils. Also included are scattered areas of Norwich soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is slow. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and strongly acid to slightly acid in the subsoil.

Most areas of this soil are used for pasture or hay because of wetness. A few areas are cultivated. This soil is suited to grass and pasture and can be used for cultivated crops if properly managed. It has fair potential for trees. The seasonal high water table and slowly or very slowly permeable subsoil limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is slight. Open and closed drains help to remove excess water and to allow for timely tillage. The use of cover crops, incorporating crop residue and manure into the surface layer, and including grasses and legumes in the cropping system help to maintain the content of organic matter and good tilth.

This Volusia soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A medium acreage is wooded, and many of the idle areas are reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow or very slow permeability and the seasonal high water table are limitations (fig. 15) for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

Figure 15.—This idle area of Volusia channery silt loam, 0 to 3 percent slopes, has a seasonal high water table and slow permeability.

This soil is in capability subclass IIIw; woodland ordination symbol is 3w.

VcB—Volusia channery silt loam, 3 to 8 percent slopes. This gently sloping, somewhat poorly drained soil is on broad uplands. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 60 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 24 inches, is mottled, dark grayish brown and brown, firm and brittle channery loam; and the lower part, to a depth of 60 inches, is mottled, brown, very firm and firm, brittle channery loam.

Included with this soil in mapping are a few areas of Chippewa, Morris, and Mardin soils and a few areas of nearly level or sloping Volusia soils. Also included are scattered areas of Norwich soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is medium. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid in the surface layer and strongly acid to slightly acid in the subsoil.

Most areas of this soil are used for hay or pasture because of wetness. A few areas are cultivated. This soil is suited to grass and pasture and can be used for cultivated crops if properly managed. It has fair potential for trees. The seasonal high water table and slowly or very slowly permeable subsoil limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and closed drains are needed to help remove excess water and to allow for timely tillage.

This Volusia soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A moderate acreage is wooded, and many of the idle areas are reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, roads should be constructed on the contour to reduce erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow or very slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIw; woodland ordination symbol is 3w.

VcC—Volusia channery silt loam, 8 to 18 percent slopes. This sloping, somewhat poorly drained soil is on side slopes of upland ridges and on hillsides. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 40 acres in size.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 24 inches, is mottled, dark, firm and brittle channery loam; and the lower part, to a depth of 60 inches, is mottled, brown, very firm and firm and brittle channery loam.

Included with this soil in mapping are a few areas of Mardin and Morris soils and a few areas of gently sloping and moderately steep Volusia soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is rapid. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium in the surface layer and strongly acid to slightly acid in the subsoil.

Most areas of this soil are used for pasture or hay because of wetness. A few areas are cultivated. This soil is suited to grass and pasture and can be used for cultivated crops if properly managed. It has fair potential for trees. The seasonal high water table, slowly or very slowly permeable subsoil, and slope limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways, help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. The seasonal high water table may interfere with the seeding and harvesting of some crops.

This Volusia soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to

maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A medium acreage is wooded, and many of the idle areas are reverting to trees. Productivity is moderately high. Removal of undesirable species helps increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow or very slow permeability, slope, and seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIe; woodland ordination symbol is 3w.

VfB—Volusia flaggy silt loam, 3 to 8 percent slopes. This gently sloping, somewhat poorly drained soil is on broad uplands. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 50 acres.

Typically, the surface layer of this soil is very dark grayish brown flaggy silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 24 inches, is mottled, dark grayish brown and brown, firm and brittle channery silt loam; and the lower part, to a depth of 60 inches, is mottled, brown, very firm and firm, brittle channery loam.

Included with this soil in mapping are a few areas of Chippewa, Morris, and Mardin soils and a few areas of nearly level Volusia soils. Also included are scattered areas of Norwich soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is medium. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan.

Most areas of this soil are used for hay or pasture because of flagstones and wetness. A few areas are cultivated. This soil is suited to grass and pasture and can be used for cultivated crops if properly managed. It has fair potential for trees. The seasonal high water table, slowly or very slowly permeable subsoil, and flagstone limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. Surface flagstones interfere with the seeding and harvesting of some crops.

This Volusia soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A medium acreage is wooded, and many of the idle areas are reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. Flagstones, the slow or very slow permeability, and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IVs; woodland ordination symbol is 3w.

VfC—Volusia flaggy silt loam, 8 to 15 percent slopes. This sloping, somewhat poorly drained soil is on side slopes of upland ridges and hillsides. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 30 acres in size.

Typically, the surface layer of this soil is very dark grayish brown flaggy silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 34 inches, is mottled, dark grayish brown and brown, firm and brittle channery loam; and the lower part, to a depth of 60 inches, is mottled, brown, very firm and firm, brittle channery loam.

Included with this soil in mapping are a few areas of Mardin and Morris soils and a few areas of gently sloping and moderately steep Volusia soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is rapid. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium in the surface layer and strongly acid to slightly acid in the subsoil.

Most areas of this soil are used for pasture or hay because of flagstones and wetness. A few areas are cultivated. This soil is suited to grass and pasture and

can be used for cultivated crops if properly managed. It has fair potential for trees. The seasonal high water table, slowly or very slowly permeable subsoil, and slope limit many nonfarm uses.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, contour stripcropping, minimum tillage, and sod waterways help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. Surface flagstones interfere with the seeding and harvesting of some crops.

This Volusia soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees. A medium acreage is wooded, and many of the idle areas are reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses. The slow or very slow permeability, slope, and seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IVs; woodland ordination symbol is 3w.

VxB—Volusia extremely stony silt loam, 0 to 8 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on broad upland ridges. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 30 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 24 inches, is mottled, dark grayish brown and brown, firm and brittle channery loam; and the lower part, to a depth of 60 inches, is mottled, brown, very firm and firm and brittle channery loam.

Included with this soil in mapping are a few areas of Chippewa, Mardin, and Morris soils and a few areas of Norwich soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is slow to medium. The subsoil has a fragipan at a depth of 12 to 20 inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. This soil is very strongly acid to medium acid in the surface layer and strongly acid to slightly acid in the subsoil.

Most areas of this soil are wooded. A few areas are used for pasture. This soil has fair potential for trees. It is suited to woodland. The extremely stony surface, seasonal high water table, and slowly or very slowly permeable subsoil limit many nonfarm uses. This soil has poor potential for cultivated crops and pasture because of the extremely stony surface. Removing numerous large surface stones and trees for these uses is not feasible.

This Volusia soil is suited to trees. A large acreage is wooded and much of the idle acreage is reverting to trees. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is not practical because of large surface stones.

This soil has limitations for most nonfarm uses.

The slow or very slow permeability, extremely stony surface, and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

VxD—Volusia extremely stony silt loam, 8 to 25 percent slopes. This sloping and moderately steep, somewhat poorly drained soil is on broad upland ridges. Slopes are generally uniform. Areas of this soil are irregular in shape and range from about 3 to more than 100 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is very dark grayish brown channery silt loam about 4 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown channery silt loam; the middle part, to a depth of 24 inches, is mottled, dark grayish brown and brown, firm and brittle channery loam; and the lower part, to a depth of 60 inches, is mottled, brown, very firm and firm and brittle channery loam.

Included with this soil in mapping are a few areas of Mardin and Morris soils and a few areas of nonstony Volusia soils.

This soil is slowly or very slowly permeable. Available water capacity is very low. Surface runoff is medium to rapid. The subsoil has a fragipan at a depth of 12 to 20

inches. This soil has a seasonal high water table at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. This soil is very strongly acid to medium acid in the surface layer and strongly acid to slightly acid in the subsoil.

Most areas of this soil are wooded. This soil is better suited to woodland than to most other uses. The extremely stony surface, slope, seasonal high water table, and slowly or very slowly permeable subsoil limit most nonfarm uses.

This Volusia soil has poor potential for pasture and cultivated crops because of the extremely stony surface. Removing large surface stones and trees for these uses is not feasible.

This soil is suited to trees and most areas are wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. During harvesting, logging roads, skid trails, and loading areas should be constructed on the contour to reduce erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is not practical because of large surface stones.

This soil has limitations for most nonfarm uses. Surface stones, the slow or very slow permeability in the subsoil, slope, and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

WcB—Wellsboro channery loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad rolling uplands. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 50 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna and Morris soils. Also included are a few scattered areas of Mardin and sloping Wellsboro soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

A large acreage of this soil is cultivated. A few areas are used for building sites. This soil has good potential for farming. It is suited to cultivated crops and pasture. It has good potential for trees.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Wellsboro soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is well suited to trees, but only a small acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses because it is slowly permeable and has a seasonal high water table. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIw; woodland ordination symbol is 2o.

WcC—Wellsboro channery loam, 8 to 15 percent slopes. This sloping, moderately well drained soil is on broad rolling uplands. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 50 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna and Morris soils. Also included are a few scattered areas of Mardin soil and gently sloping and moderately steep Wellsboro soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium to rapid. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated. A few areas are used for building sites. This soil has good potential for farming. It is suited to cultivated crops, pasture, and hayland. It has very good potential for trees.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Wellsboro soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is well suited to trees, but only a small acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses because it is slowly permeable and has a seasonal high water table. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIe; woodland ordination symbol is 2o.

Wcd—Wellsboro channery loam, 15 to 25 percent slopes. This moderately steep, moderately well drained soil is on side slopes of upland ridges and ravines. Slopes are slightly convex. Areas of this soil are generally long and narrow in shape and range from 3 to more than 40 acres in size.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsoil is about 58 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna, Morris, and moderately steep Wellsboro soils. Also included are a few scattered areas of Mardin and Wellsboro flaggy soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is rapid. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are in pasture and woodland. A few small areas are in cultivated crops. This soil has fair potential for farming. It is suited to woodland and has very good potential for trees.

If cultivated crops are grown, the hazard of erosion is very severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage, help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage.

This Wellsboro soil has fair potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses because of slope, slow permeability, and the seasonal high water table. The slow permeability, slope, and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements.

This soil is in capability subclass IVe; woodland ordination symbol is 2r.

WfB—Wellsboro flaggy loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad, rolling uplands. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 40 acres in size.

Typically, the surface layer of this soil is dark reddish brown flaggy loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna, Morris, and sloping Wellsboro soils. Also included are a few scattered areas of Mardin soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons.

Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated or in pasture. A few small areas are used for building sites. This soil has fair potential for cultivated crops and is suited to pasture. It has very good potential for trees.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. Surface flagstones interfere with the seeding and harvesting of some crops.

This Wellsboro soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses because of flagstones, slow permeability, and the seasonal high water table. The slow permeability and the seasonal high water table are limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIs; woodland ordination symbol is 2o.

WfC—Wellsboro flaggy loam, 8 to 15 percent slopes. This sloping, moderately well drained soil is on broad rolling uplands. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark reddish brown flaggy loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil, to a depth of about 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna, Morris, and gently sloping and moderately steep Wellsboro soils. Also included are a few scattered areas of Mardin soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is very strongly acid to medium acid throughout.

Most areas of this soil are in hay or pasture. A few small areas are in cultivated crops. This soil has fair potential for farming and is suited to pasture and hay. It has very good potential for trees.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. Surface flagstones interfere with the seeding and harvesting of some crops.

This Wellsboro soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses because of flagstones, slow permeability, and the seasonal high water table. The slow permeability and the seasonal high water table are severe limitations for onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IVs; woodland ordination symbol is 2o.

WgB—Wellsboro extremely stony loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad rolling uplands. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 100 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsurface layer is reddish gray fine sandy loam 1 inch thick. The subsoil is about 57 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna, Morris, and Mardin soils. Also included are a few scattered areas of nonstony Wellsboro soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. This soil is very strongly acid to medium acid throughout.

Most areas of this soil are in woodland. A few small areas are cleared and are used for building sites. This soil has poor potential for farming because of the extremely stony surface. It is well suited to woodland and has very good potential for trees.

This Wellsboro soil has poor potential for cultivated crops and pasture because of the extremely stony surface. Removing surface stones and trees for these uses is not feasible.

This soil is suited to trees, and a large acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is not practical because of the extremely stony surface.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of stones, slow permeability, and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 2x.

WgD—Wellsboro extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, moderately well drained soil is on rolling uplands and side slopes of ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 150 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is dark reddish brown channery loam about 2 inches thick. The subsurface layer is reddish gray fine sandy loam 1 inch thick. The subsoil is about 57 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown and dark brown channery loam. The lower part, to a depth of 60 inches, is reddish brown, very firm and brittle channery silt loam and channery loam.

Included with this soil in mapping are small areas of Lackawanna, Morris, and Mardin soils. Also included are a few scattered areas of nonstony Wellsboro soils.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium to rapid. The subsoil has a fragipan at a depth of 15 to 26 inches. This soil has a seasonal high water table at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. This soil is very strongly acid to medium acid throughout.

Most areas of this soil are in woodland. This soil has poor potential for farming because of the extremely stony surface. It is well suited to woodland and has very good potential for trees.

This Wellsboro soil has poor potential for cultivated crops and pasture because of surface stones. Removing the large stones and trees for these uses is not feasible.

This soil is suited to trees, and a large acreage is wooded. Productivity is high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is not practical because of the extremely stony surface.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of the stones, slow permeability, slope, and a seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 2x.

WkB—Wurtsboro channery loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 3 to more than 30 acres in size.

Typically, the surface layer of this soil is dark grayish brown channery loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil, to a depth of 21 inches, is yellowish brown gravelly loam. The lower part, to a depth of 60 inches, is dark grayish brown, firm and brittle gravelly sandy loam.

Included with this soil in mapping are small areas of Swartswood soils. Also included are a few scattered areas of soils that are silt loam above the fragipan.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan at a depth of 17 to 28 inches. This soil has a seasonal high water table at a depth of 18 to 30 inches during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is extremely acid to strongly acid throughout.

Most areas of this soil are in cropland. A few small areas are used for building sites. This soil has fair to good potential for cultivated crops and pasture. It has good potential for trees.

If cultivated crops are grown, the hazard of erosion is moderate. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and

covered drains are needed to help remove excess water and to allow for timely tillage. The channery surface may interfere with the seeding and harvesting of some crops.

This Wurtsboro soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses and for onsite waste disposal because it is slowly permeable and has a seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIw; woodland ordination symbol is 3o.

WkC—Wurtsboro channery loam, 8 to 15 percent slopes. This sloping, moderately well drained soil is on side slopes of upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 5 to more than 15 acres in size.

Typically, the surface layer of this soil is dark grayish brown loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil, to a depth of 21 inches, is yellowish brown gravelly loam. The lower part, to a depth of 60 inches, is dark grayish brown, firm and brittle gravelly sandy loam.

Included with this soil in mapping are small areas of Swartswood soils. Also included are a few scattered areas of soils that are silt loam above the fragipan.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan at a depth of 17 to 28 inches. This soil has a seasonal high water table at a depth of 18 and 30 inches during wet seasons. Rooting depth is restricted by the fragipan. Where unlimed, this soil is extremely acid to strongly acid throughout.

Most areas of this soil are cropland. A few small areas are used for building sites. This soil has fair to good potential for cultivated crops and pasture. It has good potential for trees.

If cultivated crops are grown, the hazard of erosion is severe. The use of cover crops, including grasses and legumes in the cropping system, and minimum tillage help to reduce runoff and control erosion. Diversions and covered drains are needed to help remove excess water and to allow for timely tillage. The channery surface may interfere with the seeding and harvesting of some crops.

This soil has good potential for pasture. Controlling grazing is the major concern in management. If the pasture is grazed when the soil is wet, the surface layer is subject to compaction. Proper stocking rates to maintain desirable plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are chief management needs.

This soil is suited to trees, and a medium acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting of the larger areas is practical.

This soil has limitations for most nonfarm uses and for onsite waste disposal because it is slowly permeable and has a seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass IIIe; woodland ordination symbol is 3o.

WxB—Wurtsboro extremely stony loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 5 to more than 50 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is black channery loam about 1 inch thick. The subsurface layer is grayish brown channery loam 1 inch thick. The subsoil is about 58 inches thick. The upper part of the subsoil, to a depth of 8 inches, is yellowish brown channery loam; the middle part, to a depth of 21 inches, is yellowish brown gravelly loam; and the lower part, to a depth of 60 inches, is dark brown, firm and brittle gravelly sandy loam.

Included with this soil in mapping are small areas of Swartswood soils. Also included are a few scattered areas of soils that are silt loam above the fragipan.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan at a depth of 17 to 28 inches. This soil has a seasonal high water table at a depth of 18 and 30 inches during wet seasons. Rooting depth is restricted by the fragipan. This soil is extremely acid to strongly acid throughout.

Most areas of this soil are in woodland. A few small areas are cleared and used for building sites. This soil has poor potential for farming. It is suited to woodland and has good potential for trees.

This Wurtsboro soil is too stony for cultivated crops or pasture. Removing large stones and trees for these uses is not feasible.

This soil is suited to trees, and a large acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is not practical because of stones.

This soil has limitations for most nonfarm uses and onsite waste disposal because of stones, slow permeability, and a seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

WxD—Wurtsboro extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, moderately well drained soil is on upland ridges. Slopes are slightly convex. Areas of this soil are irregular in shape and range from 10 to more than 40 acres in size. Stones cover about 15 to 30 percent of the surface.

Typically, the surface layer of this soil is black channery loam about 1 inch thick. The subsurface layer is grayish brown channery loam 1 inch thick. The subsoil is about 58 inches thick. The upper part of the subsoil, to a depth of 8 inches, is yellowish brown channery loam; the middle part, to a depth of 21 inches, is yellowish brown gravelly loam; and the lower part, to a depth of 60 inches, is dark grayish brown, firm and brittle gravelly sandy loam.

Included with this soil in mapping are small areas of Swartswood soils. Also included are a few scattered areas of soils that are silt loam above the fragipan.

This soil is slowly permeable. Available water capacity is very low to moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan at a depth of 17 to 28 inches. This soil has a seasonal high water table at a depth of 18 to 30 inches during wet seasons. Rooting depth is restricted by the fragipan. This soil is extremely acid to strongly acid throughout.

This soil is suited to woodland, and most areas are in woodland. This soil has poor potential for farming. It has good potential for trees.

This Wurtsboro soil is too stony for cultivated crops or pasture. Removing large stones and trees for these uses is not feasible.

This soil is suited to trees, and a large acreage is wooded. Productivity is moderately high. Removal of undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion.

This soil has limitations for most nonfarm uses and for onsite waste disposal because of stones, slope, slow permeability, and a seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. When buildings with basements are constructed on this soil, foundation drains with proper outlets should be used to prevent seepage of water into the basements.

This soil is in capability subclass VIIs; woodland ordination symbol is 3x.

WyA—Wyoming gravelly sandy loam, 0 to 3 percent slopes. This nearly level, deep, somewhat excessively drained soil is on stream terraces. Slopes are smooth and flat. The areas of this soil are irregular in shape and are mainly 3 to 50 acres in size.

Typically, the surface layer of this soil is dark brown gravelly sandy loam 7 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown very gravelly sandy loam. The lower part, to a depth of 25 inches, is dark brown very gravelly coarse sandy loam. The substratum, to a depth of 60 inches, is brown very gravelly loamy coarse sand that has lenses of sand and gravel.

Included with this soil in mapping are a few small areas of Unadilla soils and areas of gently sloping Wyoming soils. Also included are small, scattered areas of Braceville and Rexford soils.

This soil is rapidly permeable. Available water capacity is very low to low. Surface runoff is slow. Where unlimed, this soil is extremely acid to medium acid throughout.

Most areas of this soil are cultivated. Small areas are used for building sites. This soil has fair to good potential for cultivated crops and pasture and is suited to trees. It is a potential source of sand and gravel (fig. 16). The potential for homesites is good, but rapid permeability can be a concern for onsite waste disposal.

If cultivated crops are grown, the hazard of erosion is slight. Crops respond well to fertility and good management. The use of cover crops, crop residue, and including hay in the cropping system help to maintain the content of organic matter and good tilth. The gravelly surface can interfere with the seeding and harvesting of some crops.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Wyoming soil is suited to trees, but only a small acreage is wooded. Productivity is moderate. Management hazards are slight; however, seedling mortality is a hazard because of the very low to low available water capacity of this soil. Machine planting of the large areas is practical.

Figure 16.—Wyoming gravelly sandy loam is a good source of sand and gravel. Several large mining operations are in the survey area.

This soil has limitations for some nonfarm uses and for onsite waste disposal because of rapid permeability.

This soil is in capability subclass IIIs; woodland ordination symbol is 4f.

WyB—Wyoming gravelly sandy loam, 3 to 8 percent slopes. This gently sloping, deep, somewhat excessively drained soil is on stream terraces. Slopes are smooth and slightly convex. Areas of this soil are irregular in shape and are mainly 3 to 75 acres in size.

Typically, the surface layer of this soil is dark brown gravelly sandy loam 7 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown very gravelly sandy loam. The lower part, to a depth of 25 inches, is dark brown very gravelly coarse sandy loam. The substratum, to a depth of 60 inches, is brown very gravelly loamy coarse sand that has lenses of sand and gravel.

Included with this soil in mapping are a few small areas of Unadilla soils and areas of nearly level and sloping Wyoming soils. Also included are small, scattered areas of Braceville and Rexford soils.

This soil is rapidly permeable. Available water capacity is very low to low. Surface runoff is slow. Where unlimed, this soil is extremely acid to medium acid throughout.

Most areas of this soil are cultivated. Small areas are used for building sites. This soil has fair to good potential for cultivated crops and pasture and is suited to trees. It is a potential source of sand and gravel. The potential for homesite location is good, but rapid permeability can be a concern for onsite waste disposal.

If cultivated crops are grown, the hazard of erosion is moderate. Crops respond well to fertility and good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. The use of cover crops, crop residue, and including hay in the cropping system help to maintain the content of organic matter and good tilth. The gravelly surface can interfere with the seeding and harvesting of some crops.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Wyoming soil is suited to trees, but only a small acreage is wooded. Productivity is moderate. Manage-

ment hazards are slight; however, seedling mortality is a hazard because of the very low to low available water capacity of this soil. Machine planting of the large areas is practical.

This soil has limitations for some nonfarm uses and for onsite waste disposal because of rapid permeability.

This soil is in capability subclass IIIs; woodland ordination symbol is 4f.

WyC—Wyoming gravelly sandy loam, 8 to 15 percent slopes. This sloping, deep, somewhat excessively drained soil is on stream terraces. Slopes are smooth and slightly convex. Areas of this soil are oval to long and narrow in shape and are mainly 3 to 30 acres in size.

Typically, the surface layer of this soil is dark brown gravelly sandy loam 7 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown very gravelly sandy loam. The lower part, to a depth of 25 inches, is dark brown very gravelly coarse sandy loam. The substratum, to a depth of 60 inches, is brown very gravelly loamy coarse sand that has lenses of sand and gravel.

Included with this soil in mapping are a few small areas of Unadilla soils and areas of gently sloping and moderately steep Wyoming soils.

This soil is rapidly permeable. Available water capacity is very low to low. Surface runoff is slow to medium. Where unlimed, this soil is extremely acid to medium acid.

Most areas of this soil are cultivated. Small areas are used for building sites. This soil has fair potential for cultivated crops and pasture and is suited to trees. It is a potential source of sand and gravel. The potential for homesites is fair, but rapid permeability can be a concern for onsite waste disposal.

If cultivated crops are grown, the hazard of erosion is severe. Crops respond well to fertility and good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. The use of cover crops, crop residue, and including hay in the cropping system help to maintain the content of organic matter and good tilth. The gravelly surface can interfere with the seeding and harvesting of some crops.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Wyoming soil is suited to trees, but only a small acreage is wooded. Productivity is moderate. Management hazards are slight; however, seedling mortality is a hazard because of the very low to low available water capacity. Machine planting of the large areas is practical.

This soil has limitations for some nonfarm uses and for onsite waste disposal because of rapid permeability, slope, and the gravelly surface.

This soil is in capability subclass IVs; woodland ordination symbol is 4f.

WyD—Wyoming gravelly sandy loam, 15 to 25 percent slopes. This moderately steep, deep, somewhat excessively drained soil is on stream terraces. Slopes are smooth and convex. Areas of this soil are long and narrow in shape and are mainly 3 to 25 acres in size.

Typically, the surface layer of this soil is dark brown gravelly sandy loam 7 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown very gravelly sandy loam. The lower part, to a depth of 25 inches, is dark brown very gravelly coarse sandy loam. The substratum, to a depth of 60 inches, is brown very gravelly loamy coarse sand that has lenses of sand and gravel.

Included with this soil in mapping are a few small areas of Unadilla soils and areas of sloping and steep Wyoming soils.

This soil is rapidly permeable. Available water capacity is very low to low. Surface runoff is rapid. Where unlimed, this soil is extremely acid to medium acid.

Most areas of this soil are in pasture. Small areas are used for woodland and cultivated crops. This soil has fair potential for cultivated crops and pasture and is suited to trees. It is a potential source of sand and gravel. The potential for homesites is poor because of slope.

If cultivated crops are grown, the hazard of erosion is very severe. Crops respond fairly well to fertility and good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. The use of cover crops, crop residue, and including hay in the cropping system help to maintain the content of organic matter and good tilth. The gravelly surface can interfere with the seeding and harvesting of some crops.

When this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pasture are chief management needs. Optimum production requires maintenance of fertility through periodic applications of nutrients.

This Wyoming soil is suited to trees, but only a small acreage is wooded. Productivity is moderate. Seedling mortality is a hazard because of the very low to low available water capacity of this soil. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting of the large areas is practical.

This soil has limitations for many nonfarm uses and for onsite waste disposal because of slope, rapid permeability, and the gravelly surface.

This soil is in capability subclass IVe; woodland ordination symbol is 4f.

WyE—Wyoming gravelly sandy loam, 25 to 45 percent slopes. This steep, deep, somewhat excessively drained soil is on stream terraces. Slopes are generally

uniform. Areas of this soil are long and narrow in shape and are 5 to 20 acres in size.

Typically, the surface layer of this soil is dark brown gravelly sandy loam about 7 inches thick. The upper part of the subsoil, to a depth of 15 inches, is dark brown very gravelly sandy loam. The lower part, to a depth of 25 inches, is dark brown very gravelly coarse sandy loam. The substratum, to a depth of 60 inches, is brown very gravelly loamy coarse sand that has lenses of sand and gravel.

Included with this soil in mapping are a few areas of moderately steep Wyoming soils.

This soil is rapidly permeable. Available water capacity is very low or low. Surface runoff is very rapid. Where unlimed, this soil is extremely acid to medium acid.

Most areas of this soil are wooded. Small areas are used for pasture. This soil has poor potential for farming because of slope. It is fairly well suited to trees. The potential for most nonfarm uses is poor because of slope. The rapid permeability is a limitation for onsite waste disposal. This soil is a potential source of sand and gravel. It is too steep for cultivated crops and pasture.

This Wyoming soil is fairly suited to trees. Productivity is moderate. Equipment limitations are severe because of slope. Seedling mortality is a hazard because of the very low to low available water capacity. All logging roads, skid trails, and loading areas should be constructed on the contour to help control erosion. Machine planting is not practical because of slope.

This soil is in capability subclass VIIe; woodland ordination symbol is 4f.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

John C. Spitzer, conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are described; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Data show that in 1974 the combined income from farming in Lackawanna and Wyoming Counties was considerable (*7*). Livestock and livestock products accounted for most of this income. Horticultural crops are also important to both counties.

In Lackawanna County, only 41,700 acres was used for cropland and pasture according to the 1975 update of the Conservation Needs Inventory. Of this total, 9,300 acres was used for permanent pasture; 4,100 acres was used for row crops, mainly corn for silage; 15,801 acres was used for permanent and rotation hayland; 3,699 acres was used for rotation pastureland; and 150 acres was used for orchards.

In Wyoming County, 77,600 acres was used for cropland and pasture according to the 1975 update of the Conservation Needs Inventory. Of this total, 24,400 acres was used for permanent pasture; 8,100 acres was used for row crops, mainly corn for silage; 19,480 acres was used for permanent and rotation hayland; 5,020 acres was used for rotation pastureland; and 400 acres was used for orchards.

Many of the soils in the survey area are too stony to be used for cropland and have poor potential for increased production of food. However, most of the soils that have few or no surface stones have good potential. About 37,000 acres of potentially good cropland is currently used as woodland and about 17,000 acres is used as pasture. In addition to the reserve productive capacity of soils in the survey area, food production could also be increased considerably by extending the latest crop production technology to all the cropland.

Soil erosion is the major management hazard on most of the cropland and pasture in Lackawanna and Wyoming Counties.

Lackawanna and Bath soils are potentially productive for crops and pasture, but areas that have slopes of more than 3 percent have a moderate to severe hazard of erosion.

Loss of the surface layer through erosion is damaging for two reasons: First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a layer in or below the subsoil that limits the depth of the rooting zone. Such layers include fragipans, as in Bath, Lackawanna, Mardin, and Wellsboro soils, or bedrock as in Lordstown and Oquaga soils. Erosion also reduces productivity on soils that tend to be droughty, such as Wyoming soils. Second, soil erosion from farmland may pollute streams and reservoirs through sediment deposition. Control of erosion minimizes the pollution of streams and thereby helps maintain water quality for municipal use, for recreation, and for fish and wildlife.

In many sloping fields on channery and flaggy soils, preparing a good seedbed and tilling are difficult because the original surface soil has been eroded, leaving a high content of coarse fragments on the surface. Such areas are common on Lordstown channery silt loam and Oquaga flaggy loam. Erosion control practices provide a protective surface cover, reduce surface runoff, and increase infiltration. A cropping system that keeps a vegetative cover on the soil for extended periods minimizes soil erosion losses.

On livestock farms which require pasture and hay, the legume and grass forage crops in the cropping system help reduce erosion on sloping land, provide nutrients, and improve soil tilth.

Contour farming and stripcropping are common erosion control practices in the survey area. They are best adapted to soils that have smooth, uniform slopes including most areas of the sloping Bath, Mardin, Lackawanna, and Wellsboro soils. However, some areas of these soils have irregular slopes, making contour tillage or terracing impractical. On these soils, cropping systems that provide substantial vegetative cover are needed to help control erosion. Additional soil protection is by minimum tillage. Minimizing tillage, and using cover crops and crop residue on the surface help to increase infiltration and reduce the hazard of erosion. These practices can be adapted to most soils in the survey area. No-tillage of corn is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area, except the poorly drained and very poorly drained soils.

Terraces and diversions reduce the length of slope and reduce the hazard of erosion. They are more practical on the deep, well drained soils that have regular slopes than on most other soils. Bath, Lackawanna, and Swartswood soils are suitable for terraces and diversions. Other soils are less suitable for terraces or diversions because of irregular slopes, excessive wetness in the terrace channels, or bedrock at a depth of less than 40 inches.

Information for the design of erosion control practices for each kind of soil is available in local field offices of the Soil Conservation Service.

Soil drainage is the major management need on about 5,400 acres of land that is used for crops and pasture in the survey area. Some soils are naturally so wet that production of crops or pasture common to the area is generally not successful without artificial drainage. These are the poorly drained and very poorly drained Norwich, Chippewa, Holly, and Atherton soils.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and subsurface drainage is needed in most areas of poorly drained soils that are used for the more intensive cropping systems. Drains have to be more closely spaced in soils that are slowly permeable than in the more permeable soils. Finding adequate outlets for drainage systems commonly is difficult in areas of Holly and Atherton soils.

Soil fertility is naturally low in many soils in the survey area. Many soils on uplands are naturally strongly acid, and they require application of ground limestone to supply calcium and to raise the pH sufficiently for good growth of alfalfa and other crops. Available phosphorus and magnesium levels are naturally low in most soils.

Additions of lime and fertilizer on soils should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of lime and fertilizer to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Many soils that are used for crops in the survey area have a surface layer that is relatively low in organic matter. Generally, the structure of such soil is weak, and intense rainfall causes crusting of the exposed surface. The crust is hard when it is dry and nearly impervious to water. When the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material can help to improve soil structure and to reduce crust formation.

Fall plowing is generally not good on soils that have a silt loam surface layer low in organic matter because of the crust that forms during winter and spring. Many of the soils are nearly as dense and hard at planting time after fall plowing as they were before they were plowed. Also, most of the cropland consists of sloping soils that are subject to damaging erosion if they are plowed in fall.

Field crops that are suited to the soils and climate of the survey area include many that are not now commonly grown. Corn is the major row crop grown, although grain sorghum, potatoes, and similar crops can be grown if economic conditions are favorable. Wheat and oats are the common close-grown crops.

The most special crops grown commercially in the survey area are apples, vegetables, and nursery plants. Deep soils that have good natural drainage and that warm up early in spring are best suited to these crops. Good air drainage is needed to reduce frost damage.

In the survey area, Bath and Lackawanna soils have the best combination of soil properties and air drainage for growing fruit and vegetables. Pope and Philo soils are also good for growing vegetables, but damage can result from flooding. Soils used for low residue-producing vegetable crops need to be cover cropped or be used in rotation with heavy residue-producing crops to reduce erosion and maintain the content of organic matter.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 4.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 4 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs (*12*). A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 5. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

Woodland management and productivity

Paxton G. Wolfe, woodland conservationist, Soil Conservation Service assisted in preparing this section.

Lackawanna and Wyoming Counties have approximately 310,100 acres of woodland (*13*). This is 57 percent (Lackawanna County, 59 percent; Wyoming County, 54 percent) of the total land area in the two counties. Farmers own 20 percent (Lackawanna County, 13 percent; Wyoming County, 29 percent); forest industries own 3.5 percent (Lackawanna County, 0 percent; Wyoming County, 8 percent); private concerns own 64 percent (Lackawanna County, 81 percent; Wyoming County, 42 percent), and 12.5 percent (Lackawanna County, 6 percent; Wyoming County, 21 percent) is public owned.

Stands of second and third growth trees make up the woodland. The principal forest cover types (*9*) that make up the present woodland in the survey area and the extent of each, as given by the USDA Forest Service, are as follows:

Oak-hickory makes up 22 percent of the total woodland in the survey area. This cover type mainly consists of white oak, red oak, and hickory, although black oak is sometimes predominant. The principal associates are yellow-poplar, beech, shagbark hickory, white ash, red maple, and chestnut oak.

Elm-ash-red maple makes up 18 percent of the total woodland. This cover type is predominantly white ash, American elm, and red maple. Associates are slippery elm, yellow birch, sycamore, and hemlock.

Aspen-birch make up 17 percent of the woodland. Quaking aspen, bigtooth aspen, and gray birch, are dominant in this cover type. Principal associates are pin cherry, red maple, yellow birch, white pine, ash, and sugar maple.

Maple-beech-birch cover type is on 34 percent of the woodland in the survey area. Sugar maple, beech, and yellow birch are the component species in this cover type. Associated species are varying mixtures of basswood, red maple, hemlock, red oak, white ash, white pine, black birch, and yellow-poplar.

White pine cover type makes up 9 percent of the woodland in the survey area. White pine is pure or dominant. Principal associates are yellow-poplar, northern red oak, and white oak.

Sawtimber makes up approximately 35.4 percent of the acreage (Lackawanna County, 36 percent; Wyoming County, 35 percent) in commercial woodland; poletimber, 45.3 percent (Lackawanna County, 46 percent, Wyoming County, 44 percent); and seedlings and saplings 14.3 percent (Lackawanna County, 13 percent; Wyoming County, 16 percent). The remaining 5 percent is classified as nonstocked or less than 10 percent growing-stock trees.

In general, the soils in the survey area are capable of supporting good stands of red oak, sugar maple, and ash. Trees grow better on the deep, well drained soils than on the shallow, or poorly drained soils.

A woodland owner can encourage the growth of desirable kinds of trees by using more intensive woodland management practices on the areas where the soils are rated very high, high, and moderately high for potential productivity. Those soils rated low for potential productivity generally will not economically justify a high level of

management to increase yields of wood crops. Soils that are rated moderate are the most difficult to appraise for management of wood crops. A thorough inventory of the growing stock and their quality on the site is needed. The market potential for these species, and whether or not the soils rated moderate are mixed with larger areas of more productive soils, should be investigated to determine the level of woodland management that is economically feasible.

The woodland in Lackawanna and Wyoming Counties has value for watershed protection, recreation, wildlife habitats, and esthetic uses, as well as a source of income from wood crops. Woodland on soils rated better than moderate for potential productivity should return a good profit to the owner if properly managed and protected from fire, disease, insects, and livestock grazing.

Table 6 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, d, f, and r.

In table 6 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. The site index is listed for trees that woodland managers generally favor to grow for wood crop production. They are the most important tree species in regard to growth rate, quality, value, and marketability. Other tree species that commonly occur on the soil are also listed regardless of potential value and growth potential.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

Sammuel E. Young, area engineer, and Edward E. Steckler, civil engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil

material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading. In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment

on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 10 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

Recreation is important to Lackawanna and Wyoming Counties. The survey area is gifted with a wide variety of wildlife, picturesque mountain ranges, rolling hills, and sparkling water. The numerous and diversified recreational facilities attract thousands of tourists and residents each year and provide important sources of revenue for the counties.

Major recreational attractions are excellent hunting and fishing, water sports, golfing, camping, hiking, horseback riding, bowling, winter sports, and vacation homes. In addition to many private recreational facilities in the survey area, more than 41,000 acres of state-owned land is open to the public for various types of recreation.

Most soils have potential for some type of recreational development. The deep, well drained soils that have few or no surface stones have the best potential for most recreational uses. Soils that have a seasonal high water table and extremely stony surfaces have severe limitations for the more intensive recreational uses; although these wet, stony soils have some potential for hunting, hiking, and other types of recreation that require only slight land alteration. The soils that have the poorest potential for most recreational uses are the poorly drained and very poorly drained soils and the steep and very steep soils.

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design,

intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They should have a surface that is free of stones and boulders and have moderate slopes. Suitability of the soil for traps, tees, or greens was not considered in rating the soils. Irrigation is an assumed management practice.

Wildlife habitat

Clayton Heiney, Jr., wildlife biologist, Soil Conservation Service, helped prepare this section.

Under natural conditions, the distribution and abundance of some species of wildlife in Lackawanna and Wyoming Counties are related to the kinds of soil. Soils affect wildlife by influencing vegetation that supplies food and cover. An area is inhabited by wildlife whose habitat requirements are met by the vegetation in the area. If the natural conditions in the area are altered by drainage or other management practices used in farming or woodland production, the kinds and patterns of vegetation change. This in turn can affect the species and numbers of wildlife in the area.

Many species of game, furbearers, and songbirds are in the survey area. The principal species of game animals in the area are white-tailed deer, turkey, cottontail rabbits, squirrels, black bear, woodcock, fox, raccoon, and woodchuck.

Nongame birds and animals are numerous. Many of them, particularly the songbirds, are important because of their esthetic value and because they eat insects and the seeds of weeds. Many of the songbirds are at home in residential areas where birdwatching and birdfeeding are popular.

White-tailed deer are considered forest species, but they neither prefer nor do well in large, mature forests. They prefer a combination of brush or young trees, lesser amounts of mature trees, and small areas of openland. Deer are throughout Wyoming County and in most rural areas of Lackawanna County.

Turkeys prefer large open woods with such mature, mast-producing trees as cherry, beech, and oak. In Wyoming County, the majority of the turkey population is in the southwestern part in the Wellsboro-Morris-Oquaga association. In Lackawanna County, the bulk of the population is in the southeastern part in the Mardin-Bath-Volusia and the Wellsboro-Morris-Oquaga associations.

Black bear prefer large wooded areas with mixed stands of conifers and hardwoods. They prefer areas that have ample streams, swamps, and lakes. In Wyoming County, the bear population is confined to the southwestern corner in the Rock outcrop-Arnot-Dystrochrepts and the Wellsboro-Morris-Oquaga associations. In Lackawanna County, the population is mostly in the southeastern part in the Mardin-Bath-Volusia, the Wellsboro-Morris-Oquaga, and the Rock outcrop-Arnot-Dystrochrepts associations.

Gray squirrels and cottontail rabbits are common throughout the survey area. Squirrels are especially common in areas that have mature, nut-producing woodlands and in wooded areas adjacent to cornfields. Cottontail rabbits are common in most farming areas. The population is also substantial in urban areas where gar-

dens, lawns, and shrubbery provide excellent habitat and protection.

Grouse are scattered throughout the survey area; however, the population is low. They prefer young brushy stands of trees and areas of openland similar to the areas that white-tailed deer frequent.

Woodcock are common in the northeastern part of Wyoming County in the Mardin-Lordstown-Volusia and the Wellsboro-Morris-Oquaga associations. In Lackawanna County, woodcock are common throughout.

Snowshoe hares are common in isolated areas. They are in cool, shrubby bogs or swampland that is thickly overgrown with spruce, hemlock, blueberry bushes, or brush. In Lackawanna County, the population is generally confined to the Rock outcrop-Arnot-Dystrochrepts, the Wellsboro-Morris-Oquaga, and the Mardin-Bath-Volusia associations in the southeastern corner of the county. In Wyoming County, hares are common in the Rock outcrop-Arnot-Dystrochrepts and the Wellsboro-Morris-Oquaga associations in the southwestern corner of the county.

Bobcats are limited in number in isolated parts of the survey area. In Wyoming County, they are confined to the remote wooded areas of the Rock outcrop-Arnot-Dystrochrepts and the Wellsboro-Morris-Oquaga associations in the southwestern corner of the county. In Lackawanna County, bobcats are confined to the remote wooded areas of the Mardin-Bath-Volusia and the Wellsboro-Morris-Oquaga associations in the southeastern corner of the county.

Woodchucks and raccoons are common throughout the farmland of the survey area.

Foxes are common throughout. Gray fox are generally in the wooded or mountainous areas, and red fox are more common in the farming areas.

Waterfowl, mainly mallards, wood ducks, black ducks, and Canada geese, are found throughout the survey area where there is open water. The Susquehanna River, lakes, and large farm ponds provide good habitat for these migratory birds.

Muskrat, beaver, and some mink are found along the rivers, streams, and ponds in the survey area. Muskrats are found throughout both counties, whereas mink and beaver are generally found in the more remote areas.

The rivers and numerous lakes, ponds, and streams produce large populations of bass, bluegills, perch, catfish, rockbass, pickerel, and walleyes. More than 80 miles of streams and numerous lakes in the survey area are stocked with trout. Also, native trout are common in small mountain streams in the Oquaga-Lackawanna-Arnot association. Muskellunge are stocked in the Susquehanna River and appear to be thriving.

Distribution and abundance of the wildlife species in Lackawanna and Wyoming Counties have been greatly affected by patterns of land use, especially increased urban development. The distribution and abundance of such species as the black bear, beaver, and bobcat are affected more by land use patterns than by soil type or vegetation. Most soils in the survey area are suitable for use as woodland, wildlife habitat development, parks, and refuges. Habitat for songbirds can be developed in residential areas. The streams, lakes, ponds, and reservoirs in the survey area have potential for greater use as wildlife habitat.

In table 12, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that

affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture (*11*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added,

for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (*Unified*) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 13. Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be

required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based

on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Laboratory data

Professors R. L. Cunningham, R.P. Matelski, and G. W. Petersen and Associate Professors E. J. Ciolkosz and R. Pennock, Jr., Department of Agronomy, The Pennsylvania State University helped prepare this section.

Laboratory soil characterization, along with field observations, measures properties that are useful in studying soil formation processes, interpreting land use limitations, classifying pedons and series, and understanding genetic concepts of soils. The factors that influence soil formation may vary independently; consequently, soils may be variable even though their apparent environment is similar. Detailed studies help soil scientists understand the relationship of soil forming factors. The characterization studies in Lackawanna County add to information previously collected (*3, 4, 14, 15, 16*). They are particularly applicable to the glaciated physiographic provinces of northeast Pennsylvania and are continuing in these areas.

Four soil series that are extensive in Lackawanna County, the Arnot, Morris, Oquaga, and Wellsboro series, are discussed in this section. These series are representative of Lithic Dystrochrepts, Aeric Fragiaquepts, Typic Dystrochrepts, and Typic Fragiochrepts subgroups that relate, respectively, to these soils. Described in this section are general interpretations based on laboratory data and cumulative soil characterization studies that were made by the Agronomy Department, The Pennsylvania State University.

Clay content is an indicator of reactive physical and chemical properties of a soil. Increased clay generally increases soil plasticity, shrink-swell potential, and cation exchange capacity. The amount of water held increases with increasing clay content; however, the water available to plants does not necessarily increase. Clay is a mobile component of soils and commonly reveals the state or degree of soil development, depending on its distribution in the soil.

Soils that have a relatively low amount of clay in the surface, highest amount of clay in the 25- to 75-centimeter depth, and then a decreased amount of clay below a depth of 100 centimeters contain an argillic horizon. The four soils discussed here have not undergone the formation necessary for an argillic horizon to develop. Changes in the clay content of these soils, as depth increases, reflect differences in the glacial till deposits in which these soils formed (fig. 17).

Clay content in the shallow Arnot (3508) soil more than doubles from the A2 horizon to the C horizon, a depth of 25 centimeters; however, the fine earth (soil particles with diameter of 2 millimeters or less) is only about 55 percent of the total soil material. This soil has a high content of rock fragments. Clay may have been translocated in the B or C horizons but no clay films are present as evidence of clay movement. The clays were identified in the B horizon as 40 percent vermiculite, 20 percent illite, 25 percent chlorite, and 15 percent mixtures of these.

The Oquaga (3507) soil has decreasing clay content as depth increases and has proportions of clay types that are similar to the Arnot soil. These two soils show minimum morphological development. The high rock fragment content (fig. 18), the depth to bedrock, and the steep slopes limit the use of Arnot and Oquaga soils.

Clay content in Morris (3501) and Wellsboro (3504) soils tends to be 15 to 20 percent in the upper horizons and increase slightly as depth increases. As little morphological development has been shown, differences in clay content are likely because of differences in clay content of the layers of till. Neither soil has the clay distribution nor the clay films indicative of an argillic horizon. The absence of clay translocation implies that soil forming processes have not been intense enough or long enough for argillic horizons to develop. Most of the till soils of the northern tier of counties in Pennsylvania show a similar clay distribution.

Available water capacity refers to the water in a soil that plants can use. The amount of available water in the root zone is associated with depth, texture, structure, and content of organic matter. Coarse silt and very fine sand hold more available water than other particle sizes, and high content of these particle sizes generally indicates high available water capacity.

Figure 19 illustrates the decrease of available water with depth for Morris (3501) and Wellsboro (3504) soils. The compactness of the glacial till increases with depth and there are fewer pore spaces for water storage. Both soils have a fragipan. The porosity is such that little water is stored and roots cannot penetrate the fragipan to obtain the moisture that is there. The high rock fragment content prevented bulk density and available water analyses of Arnot (3508) and Oquaga (3507) soils.

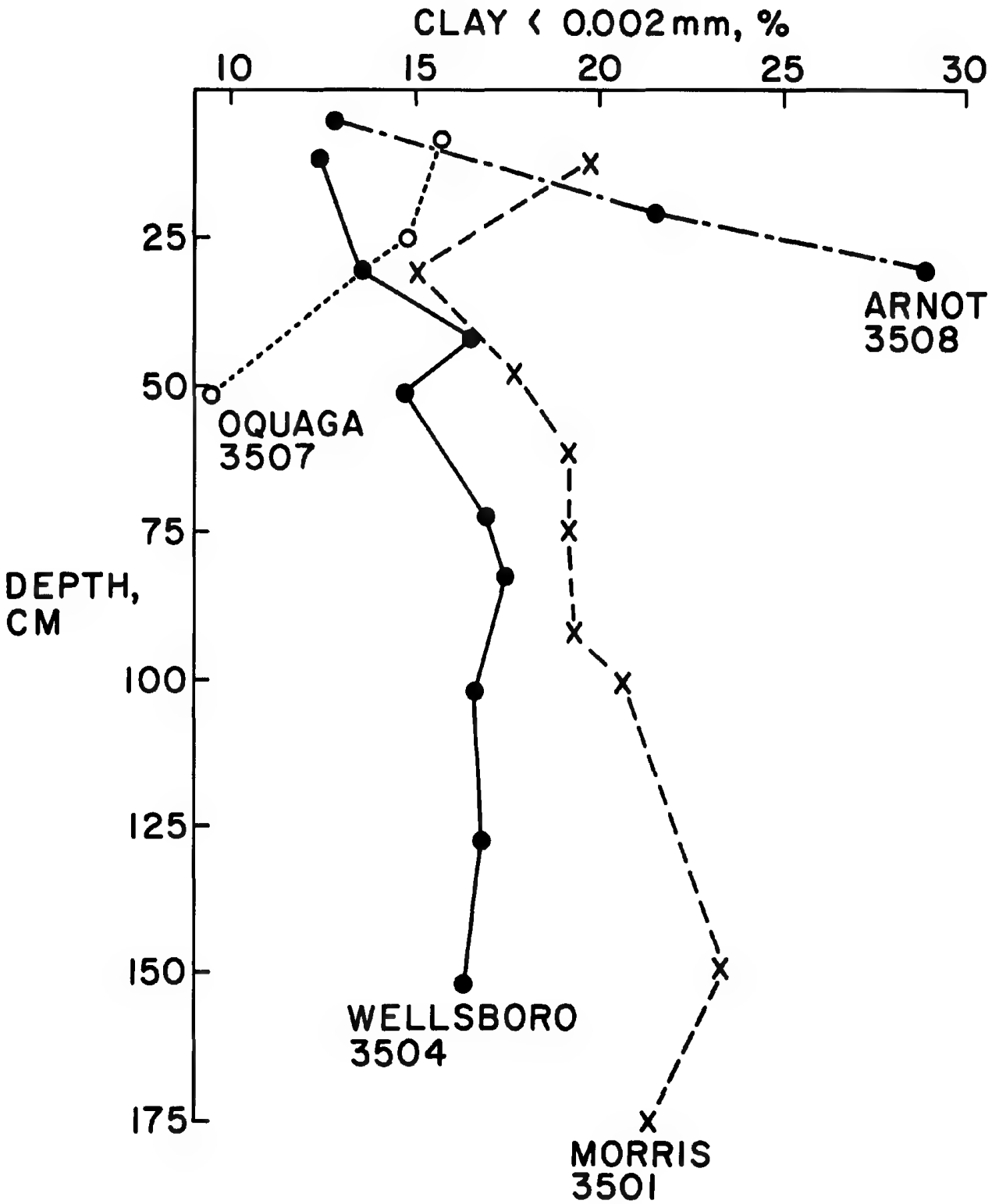


Figure 17.—Clay distribution in typical pedons of Arnot, Morris, Oquaga, and Wellsboro soils.

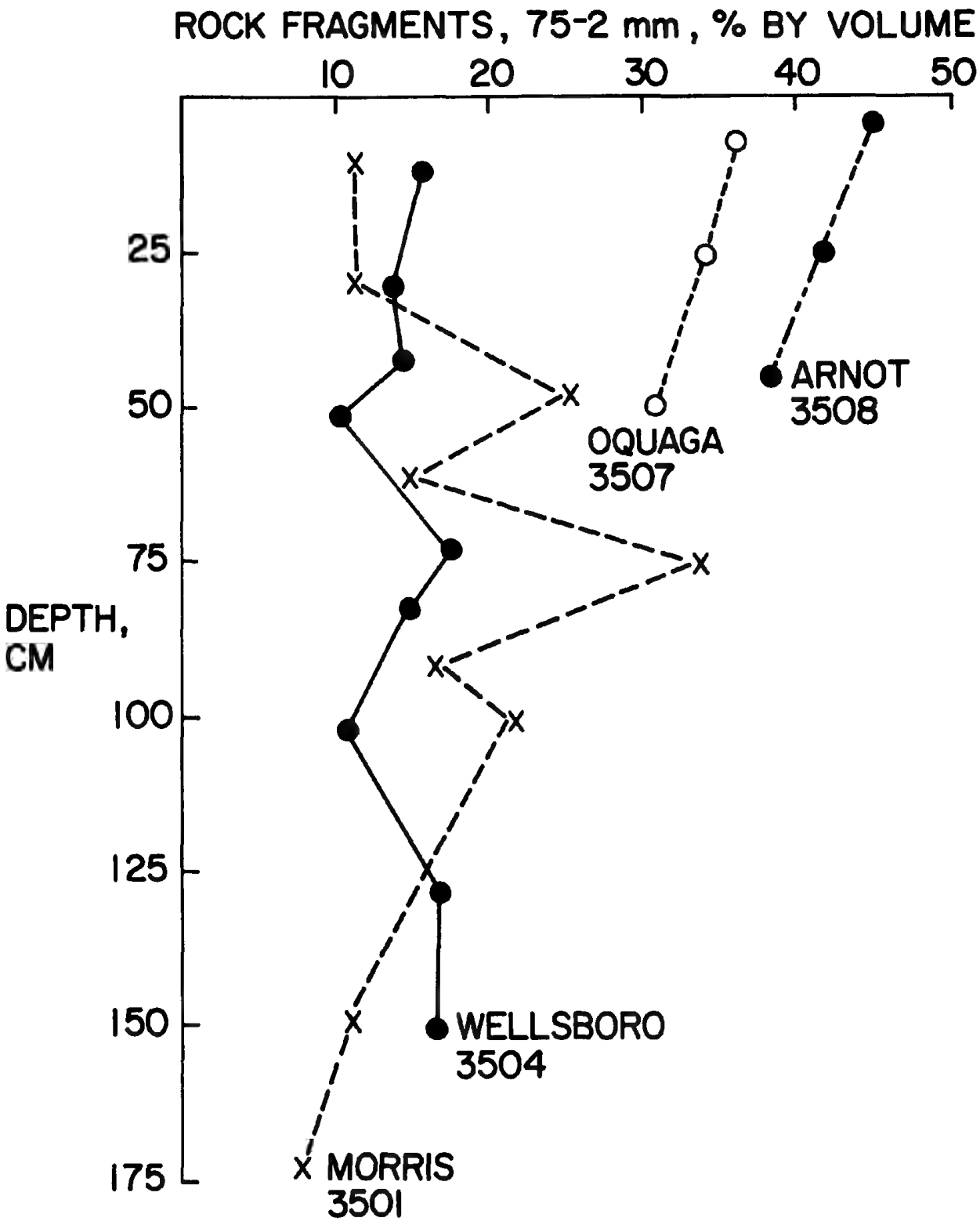


Figure 18.—Rock fragments, percent by volume, in typical pedons of Arnot, Morris, Oquaga, and Wellsboro soils.

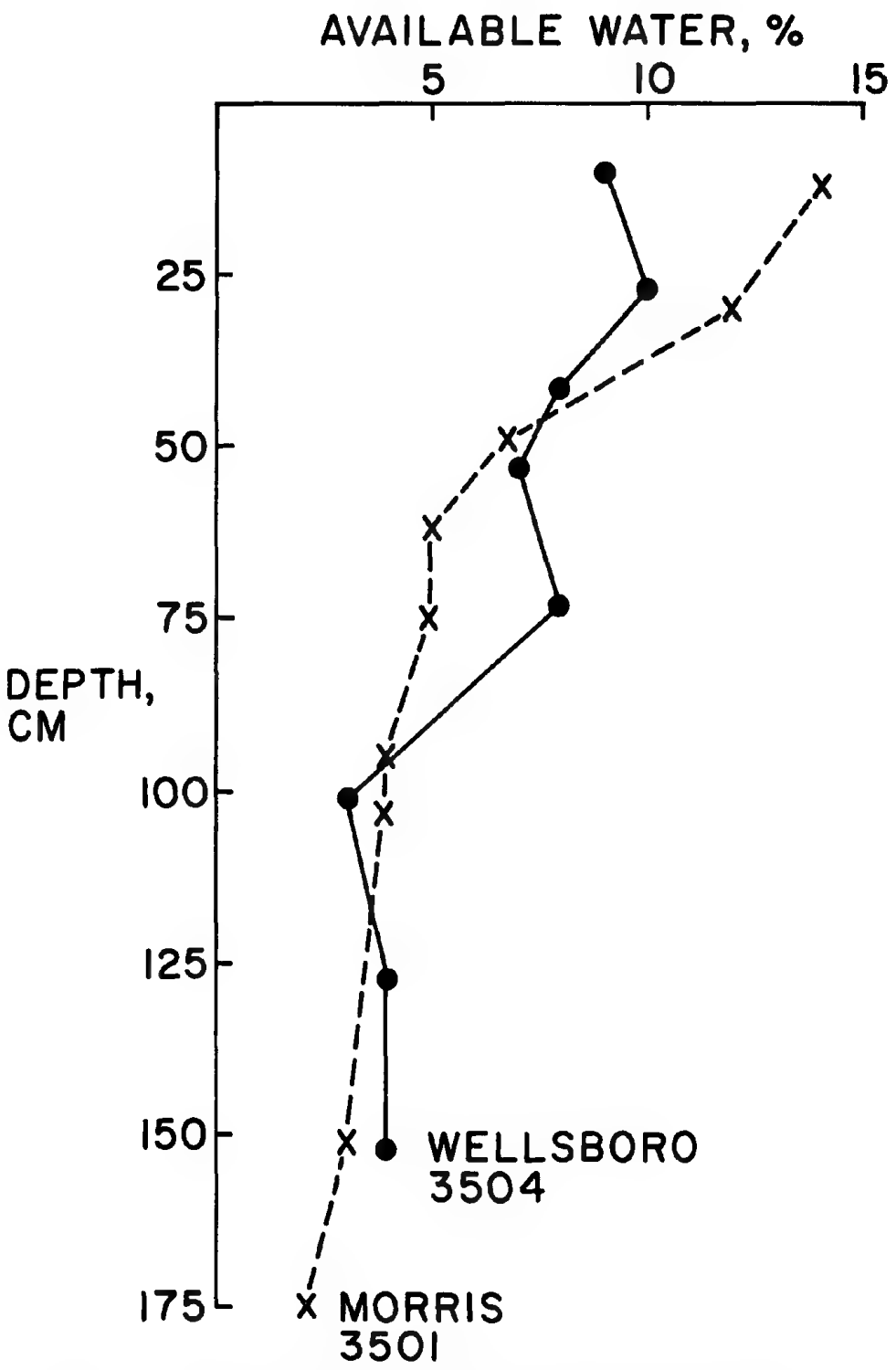


Figure 19.—Available water, in percent, in typical pedons of Morris and Wellsboro soils.

Nutrients in a soil is indicated by the laboratory- measured cation exchange capacity of the fine earth. The active mineral soil material is less than 0.002 millimeter in diameter, and trends in exchange capacity are shown by the trends in clay percentages. Organic matter also contributes to cation exchange capacity with the highest capacity in the horizons that contain the most organic matter. Measured in milliequivalents per 100 grams of soil, surface horizons of the soils in Lackawanna and Wyoming Counties commonly have a cation exchange capacity of about 15.

Soils are acid or basic depending upon the kind of cations on the exchange complex. When the cation exchange capacity of the soil is dominated by hydrogen and aluminum ions, the soil is acid and the pH is low. Conversely, the soil is basic and the pH is high when the complex is dominated by calcium ions. In humid climate, precipitation and vegetation deplete the soil of exchangeable calcium. Figure 19 illustrates the changes in exchangeable calcium with depth for the four soils. The amount of exchangeable calcium gives an indication of the soil chemistry of these soils.

Some bases are associated with the organic matter that is being recycled; however, the nutrient reserves of these soils are low. Only the Morris (3501) soil has parent material that has higher extractable calcium in the C horizon than in the root zone. Both Morris (3501) and Wellsboro (3504) soils have probably received agricultural limestone that has raised the extractable calcium above 5 milliequivalents per 100 grams in the Ap horizon. The extremely low calcium content of Arnot (3508) and Oquaga (3507) soils is typical of these soils. Other bases are similarly low and pH ranges from 4 to 5. Low pH is accompanied by higher extractable aluminum, reaching 6 milliequivalents per 100 grams for one horizon in the Arnot (3508) soil.

Rock fragments are particles that have a diameter of more than 2 millimeters and are not included in chemical, mineralogical, and some physical analyses. Figure 20 shows the volume percentages of fragments in the total soil material with depth. The depth of soil and amount of rock fragments are closely related; the shallower the pedon the more rock fragments in the pedon.

Soils that have a high amount of fragments have severe limitations for most uses. High amounts of fragments, such as more than 30 percent in the Arnot (3508) and Oquaga (3507) soils, dilute the effectiveness of the fine earth part of the soil. For example, if a horizon has 50 percent rock fragments by volume and the less than 2-millimeter material is 20 percent clay, then the clay percentage for the total horizon is 10 percent. Analogous calculations can be made for other physical and chemical properties determined for the fine earth.

Rock fragments on the soil surface dissipate some of the energy of raindrops. Therefore, soils that have a moderate amount of rock fragments on the surface tend to resist erosion. Movement of water within the soil is generally proportional to the content of coarse fragments and is commonly more in soils that have the most coarse fragments.

Formation and classification of soils

This section tells how the factors of soil formation have affected the development of soils in Wyoming and Lackawanna Counties. It also explains the system of soil classification and classifies the soils in the survey area according to that system.

Factors of soil formation

Soils are complex mixtures of weathered rock, primary minerals, secondary minerals, organic matter, water, and air. The components are present in varying quantities. Soil forms through the action of climate, plants, and animals on chemically and physically weathering geologic materials over long periods of time (*10*).

The characteristics of all soils depend on the nature of the parent material, the climate of the area, the relief or lay of the land, the plant and animal life, and the length of time the materials have been exposed.

In such small areas as Wyoming and Lackawanna Counties, in which vegetation and climate have little variation, the nature of the parent material strongly affects the local variations in texture and mineral content of the soils. Climate influences the nature of the weathering and soil-forming processes. Relief affects drainage, aeration, runoff, erosion, and exposure to sun and wind. Plant and animal life influence soils by physical and chemical removals and additions. Time is required for all of the other soil-forming factors to be effective. The soil is constantly changing, and most features in the soil become apparent only after long periods of time.

Parent material

Parent materials of the soils of Wyoming and Lackawanna Counties are mostly glacial till and outwash, with some alluvium. These materials were derived mainly from local red and gray sandstone, siltstone, and shale.

Soils on uplands, such as the Bath, Lackawanna, Wellsboro, Morris, Mardin, Volusia, and Norwich soils, formed in the deep glacial till that covered the area. Where the slopes are steepest, little glacial till was deposited, or it was eroded away after the glaciers retreated. The moderately deep Oquaga and Lordstown and shallow Arnot soils are present in these areas.

Wyoming, Braceville, Rexford, and Atherton soils on terraces formed in outwash sand and gravel that was

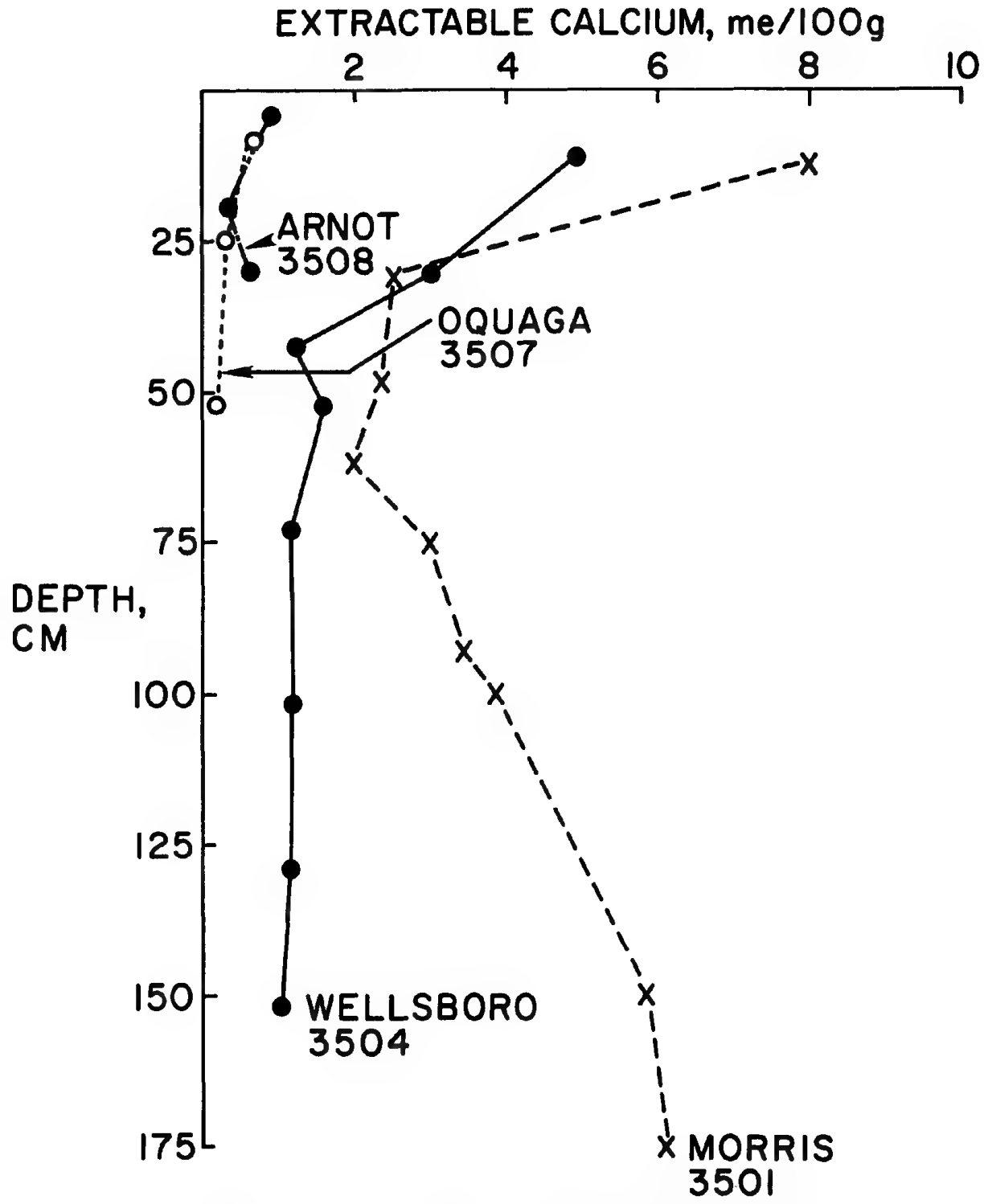


Figure 20.—Extractable calcium in typical pedons of Arnot, Morris, Oquaga, and Wellsboro soils.

deposited in the larger stream valleys and as scattered kames or terraces on the uplands.

The alluvial deposits along the streams consist of stratified silt, sand, and gravel. In these deposits some of the youngest soils formed, such as Pope, Philo, and Holly soils.

The uplands have many closed depressions and blocked valleys in which there are small lakes or shallow ponds. In some of these places, sphagnum bogs developed and in others, woody bogs developed. In this wet environment plants grew, died, and fell into the water where they were partly preserved. Medisaprists and Medihemists soils formed in these accumulations of organic materials.

Climate

The climate of Wyoming and Lackawanna Counties is the humid, temperate, continental type of the Middle Atlantic States. Some features of soils in the survey area indicate the influence of climate on soil formation. Most soils are very acid and have been leached of bases. The effect of climate on soil formation has been fairly uniform throughout the survey area, but microclimate in places, caused by differences in relief, has influenced individual soils. For additional information on climate, see section "General nature of the counties".

Plant and animal life

Living organisms important to soil formation include plants, animals, bacteria, and fungi. Plants are largely responsible for the amount of organic matter, the color, and the accumulation of nutrients in the surface layer. Earthworms, cicada, and other burrowing animals help keep the soil open and porous. Bacteria and fungi decompose the vegetation, thus recycling nutrients for plant food. In Lackawanna and Wyoming Counties, the native forests have had a profound influence on soil formation. Man, however, has greatly affected the soil surface where he has cleared the forests and plowed the land. He has added fertilizers, mixed some of the soil horizons, and moved soil material place to place. Continuous farming for more than 200 years has caused accelerated erosion on some soils.

Relief

Before the advance of the Wisconsin glaciers, the streams had dissected the uplands and formed valleys to produce a hilly landscape. The advancing ice tended to plane off the hills and fill in many of the stream valleys. The major streams then cut into these unconsolidated deposits, and the uplands now form a gently sloping to moderately steep plateau. Slopes in few places exceed 25 percent, except in the mountainous parts of the counties where the major streams have cut 400 to 800 feet into the plateau.

Relief influences soil formation through its influence on drainage, erosion, plant cover, and soil temperature. Relief varies widely and accounts for many differences in the soils in Lackawanna and Wyoming counties. The Atherton, Norwich, and Chippewa soils formed in low lying areas where natural drainage is impeded. The Bath, Lackawanna, and Swartswood soils formed in gently sloping and steeper areas where excess water drained away and excess erosion has not occurred. The Arnot, Oquaga, and Lordstown soils formed in gently sloping to very steep areas where excess erosion has occurred.

Time

Time is needed to produce soil. The last glacial advance and retreat in the Wyoming and Lackawanna County uplands was of Wisconsin age about 10,000 to 14,000 years ago. The soils, therefore, are not so old nor so well developed as most of those in the southeastern counties of Pennsylvania, which have not been glaciated.

Soils that formed in alluvial materials, such as the Pope and Philo soils, are young because their parent materials have been in place for a shorter time than the parent materials of other soils. They generally have less distinct horizons than many of the older soils on uplands. In uplands and terraces, the Lordstown, Oquaga, and Wyoming soils have horizons which indicate some changes have occurred. These changes, however, are not so distinct as in the older, more developed soils in the southern part of the State. Weathering and profile development of these Lordstown, Oquaga, and Wyoming soils were slowed by the effects of topography and glaciation.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*17*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 16, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place.

Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquept (*Aqu*, meaning water, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Fragiaquepts (*Fragi*, meaning brittle, plus *aquept*, the suborder of Inceptisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Fragiaquepts.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Fragiaquepts.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*11*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Arnot series

Soils of the Arnot series consist of loamy-skeletal, mixed, mesic Lithic Dystrochrepts. These soils are shallow and somewhat excessively drained. They are on uplands on ridgetops and mountainsides. Arnot soils formed in glacial till over red shale and gray and reddish sandstone. Slope ranges from 0 to 70 percent but is dominantly 3 to 35 percent.

Arnot soils are on the landscape with the moderately deep Lordstown and Oquaga soils and Dystrochrepts and Rock outcrop.

Typical pedon of Arnot very channery silt loam, in an area of Arnot channery silt loam, very rocky, 3 to 15 percent slopes, 2 miles southeast of Eatonville on Route 65005, then 1.1 mile south on Route T370, 200 yards west of the road, in Christmas tree plantation:

Ap—0 to 9 inches; dark brown (10YR 3/3) very channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 65 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B2—9 to 19 inches; yellowish brown (10YR 5/4) channery silt loam; weak coarse and fine subangular blocky structure; friable, nonsticky and slightly plastic; 40 percent coarse fragments; medium acid; gradual wavy boundary.

R—19 inches; reddish gray (5YR 5/2) fine grained sandstone.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. Coarse fragments in the A horizon range from 25 to 65 percent, and they range from 35 to 80 percent in the B horizon and in the C horizon. Reaction is extremely acid to medium acid throughout the soil.

The Ap horizon and A1 horizon have hue of 5YR to 10YR, value of 2 to 4, and chroma of 2 or 3.

The B horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6.

The fine earth fraction is silt loam or loam in the B and C horizons.

Atherton series

Soils of the Atherton series consist of fine-loamy, mixed, nonacid, mesic Aeric Haplaquepts. These soils are deep and very poorly drained. They are in slightly concave areas on glacial outwash terraces. Atherton soils formed in stratified glacial outwash material. Slope ranges from 0 to 3 percent.

Atherton soils are on the landscape with the somewhat excessively drained Wyoming soils, the moderately well drained Braceville soils, and the poorly drained and somewhat poorly drained Rexford soils.

Typical pedon of Atherton loam, ponded, in a pasture 300 yards west of State Road 65041, 0.3 mile south of Laceyville:

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; very friable, nonsticky and slightly plastic; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21g—9 to 20 inches; light brownish gray (2.5Y 6/2) heavy gravelly loam; many large prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable, nonsticky and slightly plastic; 20 percent coarse fragments; medium acid; gradual smooth boundary.

IIB22—20 to 24 inches; reddish brown (5YR 4/4) gravelly sandy clay loam; few medium distinct light brownish gray (10YR 6/2) mottles; weak medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; medium acid; gradual smooth boundary.

IIB23g—24 to 36 inches; gray (2.5Y 6/) heavy gravelly sandy clay loam; many large prominent strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; friable, slightly sticky and plastic; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

IIICg—36 to 60 inches; grayish brown (10YR 5/2) gravelly loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; 20 percent coarse fragments; medium acid.

Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is more than 10 feet. Rounded coarse fragments in the solum range from 0 to 20 percent above a depth of 20 inches and 0 to 30 percent below 20 inches, and they range from 10 to 75 percent in the C horizon. Reaction is strongly acid to slightly acid in the upper part of the solum and medium acid and slightly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR, value of 3 and 2, and chroma of 1 and 2. The B horizon has hue of 2.5Y to 5YR, value of 4 to 6, and chroma of 0 to 4. The C horizon has colors similar to the B horizon.

The fine earth fraction of the B horizon is sandy loam, loam, or sandy clay loam. The C horizon is dominantly loam in the fine earth, with stratified layers of sand and gravel.

Bath series

Soils of the Bath series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and well drained. They are on uplands on convex ridgetops and the lower parts of mountains. Bath soils formed in glacial till. Slope ranges from 3 to 70 percent but is dominantly 8 to 25 percent.

Bath soils are on the landscape with the Mardin, Volusia, Lordstown, Lackawanna, and Swartswood soils. They have a fragipan below a depth of 26 inches, whereas the Mardin and Volusia soils have a fragipan within 26 inches and are mottled in the B2 horizon. Bath soils have bedrock below a depth of 48 inches, whereas the Lordstown soils have bedrock within a depth of 40 inches. Bath soils are not as red as the Lackawanna soils. They are finer textured than the Swartswood soils.

Typical pedon of Bath channery silt loam, in an area of Bath extremely stony silt loam, 3 to 8 percent slopes, 1.2 miles south of Lake Carey on Route 29, 7 mile east on Route T405, 200 feet south of road, in woodlot:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 40 percent coarse fragments; strongly acid; clear wavy boundary.

B21—2 to 10 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium and fine subangular blocky structure; friable, nonsticky and slightly plastic; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

B22—10 to 30 inches, yellowish brown (10YR 5/4) channery silt loam; weak coarse subangular blocky structure; friable, nonsticky and slightly plastic; 30 percent coarse fragments; medium acid; abrupt wavy boundary.

Bx—30 to 60 inches, dark brown (7.5YR 4/4) channery silt loam; weak very coarse prismatic structure; pale brown (10YR 6/3) loam wedges; massive within prisms; very firm, brittle, nonsticky and slightly plastic; 30 percent coarse fragments; medium acid.

Thickness of the solum ranges from 40 to 70 inches. Depth to bedrock is more than 48 inches. Depth to the Bx horizon ranges from 26 to 40 inches. Coarse fragments range from 15 to 40 percent above the Bx horizon and from 20 to 50 percent in the Bx horizon and in the C horizon. Where unlimed, this soil is very strongly acid to medium acid above the Bx horizon and strongly acid or slightly acid in the Bx horizon and in the C horizon.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The B2 horizon has hue of 7.5YR and

10YR, value of 5 or 4, and chroma of 4 to 6. The Bx horizon and C horizon have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The fine earth fraction of the B horizon and the C horizon is silt loam or loam.

Braceville series

Soils of the Braceville series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They are on glacial outwash terraces, benches, and water sorted moraines, above present stream overflow. Braceville soils formed in poorly sorted glacial outwash. Slope ranges from 2 to 6 percent.

Braceville soils are on the landscape with the deep and somewhat excessively drained Wyoming soils, the deep and somewhat poorly drained and poorly drained Rexford soils, and the very poorly drained Atherton soils.

Typical pedon of Braceville gravelly loam, 2 to 6 percent slopes, 1/4 mile north of Route 35030 on State Highway 438, in a pasture 1/8 mile east of highway, 200 feet west of creek:

Ap—0 to 9 inches; dark yellowish brown (10YR 3/4) gravelly loam; weak fine granular structure; friable, nonsticky and nonplastic; 25 percent gravel; strongly acid; abrupt smooth boundary.

B2—9 to 19 inches; yellowish brown (10YR 5/4) gravelly silt loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; 25 percent gravel; very strongly acid; clear wavy boundary.

Bx1—19 to 27 inches; dark yellowish brown (10YR 4/4) gravelly heavy silt loam; many medium distinct dark brown (7.5YR 4/4), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium and fine subangular blocky; firm and brittle; slightly sticky and plastic; 35 percent gravel; strongly acid; clear wavy boundary.

IIBx2—27 to 37 inches; dark brown (7.5YR 4/4) gravelly sandy loam; common medium distinct mottles of dark reddish brown (2.5YR 3/4) and dark yellowish brown (10YR 3/4); weak very coarse prismatic structure; firm and brittle, nonsticky and nonplastic; 45 percent gravel; strongly acid; abrupt irregular boundary.

IIIC—37 to 72 inches; dark yellowish brown (10YR 3/4) very gravelly loam; massive; firm, nonsticky and nonplastic; 85 percent gravel; medium acid.

Thickness of the solum ranges from 30 to 40 inches. Depth to bedrock is 60 inches or more. Depth to the Bx horizon ranges from 18 to 30 inches. Coarse fragments in the upper part of the solum range from 0 to 30 percent and in the lower part range from 20 to 50 percent. Where unlimed, the soil is very strongly acid to medium acid above the Bx horizon and strongly acid to slightly acid in the Bx horizon and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4.

The B2 horizon and Bx horizon have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Low chroma mottles are at a depth of 18 to 36 inches.

The fine earth fraction of the B2 horizon and the Bx horizon is silt loam to sandy loam. The fine earth fraction of the C horizon ranges from silt loam to sandy loam to stratified sand and gravel.

Chippewa series

Soils of the Chippewa series consist of fine-loamy, mixed, mesic Typic Fragiaquepts. These soils are deep and poorly drained. They are on flat to slightly concave uplands where surface runoff is slow. Chippewa soils formed in glacial till. Slope ranges from 0 to 8 percent.

Chippewa soils are on the landscape with the very poorly drained Norwich soils and the somewhat poorly drained Morris and Volusia soils.

Typical pedon of Chippewa channery silt loam, in an area of Norwich and Chippewa channery silt loams, 0 to 3 percent slopes, in a hayfield, 2 miles north of Tunkhannock along Route 65053, 50 feet northeast of highway, in idle field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) channery silt loam; weak fine subangular blocky structure; very friable, slightly sticky and slightly plastic; 15 percent coarse fragments; medium acid; abrupt smooth boundary.

B21g—7 to 12 inches; light gray (10YR 6/1) channery silt loam; few medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 15 percent coarse fragments; strongly acid; gradual smooth boundary.

B22g—12 to 18 inches; light gray (10YR 6/1) silt loam; few medium distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable, sticky and plastic; 10 percent coarse fragments; medium acid; clear wavy boundary.

Bx1g—18 to 28 inches; light gray (10YR 6/1) channery silt loam; weak, very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; 20 percent coarse fragments; medium acid; gradual wavy boundary.

Bx2g—28 to 52 inches; grayish brown (10YR 5/2) channery silt loam; strong very coarse prismatic structure, massive within prisms; very firm and brittle, nonsticky and slightly plastic; 30 percent coarse fragments; medium acid; gradual wavy boundary.

Cg—52 to 65 inches; dark grayish brown (10YR 4/2) channery silt loam; massive; firm, nonsticky and

slightly plastic; 30 percent coarse fragments; medium acid.

Thickness of the solum ranges from 40 to 56 inches. Depth to bedrock is more than 60 inches. Depth to the Bx horizon ranges from 12 to 20 inches. Coarse fragments above the Bx horizon range from 5 to 35 percent, and in the Bx horizon and in the C horizon range from 20 to 45 percent. Where unlimed, this soil is very strongly acid to slightly acid above the Bx horizon, strongly acid to medium acid in the Bx horizon, and medium acid and slightly acid in the C horizon.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The B horizon and C horizon have hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The fine earth fraction of the B2 horizon is loam, silt loam, or silty clay loam. The fine earth fraction of the Bx horizon and C horizon is silt loam, loam, or fine sandy loam.

Dystrochrepts

Dystrochrepts consist of deep to shallow, well drained and somewhat excessively drained soils. These soils are on mountaintops, on side slopes, and in cliff areas along the Susquehanna River. Dystrochrepts formed in glacial till. Slope ranges from 0 to 70 percent.

Dystrochrepts are commonly near Arnot, Lordstown, and Oquaga soils and Rock outcrop. They do not have the distinct horizons of the Arnot, Lordstown, and Oquaga soils.

Because of the variability of these soils, a typical pedon is not described. These soils have sola that range from 10 to more than 60 inches thick. Depth to bedrock ranges from 10 to 60 inches or more. Coarse fragments in individual horizons range from 15 to 70 percent. The soils are extremely acid to strongly acid throughout. Base saturation is less than 60 percent between 25 and 75 centimeters.

The A horizon is 1 inch to 4 inches thick. It dominantly has hue of 10YR and 7.5YR, value of 3 or 4, and chroma of 3. It is channery, very channery, flaggy, or very flaggy. The fine earth fraction is silt loam or loam.

The B horizon ranges from 6 to 60 or more inches in thickness. It dominantly has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 3 or 4. The B horizon ranges from channery silt loam or very channery silt loam to channery loam or very channery loam.

The C horizon ranges from channery silt loam or very channery silt loam to channery loam or very channery loam.

Fluvaquents

Fluvaquents consist of deep, somewhat poorly drained to very poorly drained soils. These soils are on flood plains along streams and on river islands. They formed in stratified alluvial sediment. Slope ranges from 0 to 1 percent.

Fluvaquents commonly are near Fluvents and Holly, Philo, and Pope soils but in positions where frequent stream overflow causes deposition and erosion. Fluvaquents do not have the distinct horizons that the Holly, Philo, and Pope soils have, and they are more poorly drained than Fluvents.

Because of the variability of these soils, a typical pedon is not described. These soils have little or no profile development in recent deposits. Depth to bedrock is more than 4 feet. Coarse fragments in individual horizons range from 0 to 60 percent. The soils are extremely acid to strongly acid.

The A horizon is 2 to 8 inches thick. It dominantly has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3. It ranges from sandy loam to silt loam and can be gravelly or very gravelly.

The C horizon varies widely in color. It ranges from sand to silty clay loam and is gravelly, very gravelly, cobbly, or very cobbly. Depth to gray mottles ranges from 6 to 20 inches.

Fluvents

Fluvents consist of deep and moderately well drained to excessively drained soils. These soils are on flood plains along streams and on river islands. They formed in stratified alluvial sediment. Slope ranges from 0 to 3 percent.

Fluvents commonly are near Fluvaquents and Holly, Philo, and Pope soils but in positions where frequent stream overflow causes deposition and erosion. Fluvents do not have the distinct horizons of the Holly, Philo, and Pope soils, and they are better drained then Fluvaquents.

Because of the variability of these soils, a typical pedon is not described. These soils have little or no profile development in recent deposits. Depth to bedrock is more than 48 inches. Coarse fragments in individual horizons range from 0 to 80 percent. The soils are extremely acid to strongly acid.

The A horizon, is 0 to 6 inches thick. It dominantly has hue of 7.5YR, value of 3 or 4, and chroma of 2 or 3. It ranges from loamy sand to silt loam and can be gravelly or very gravelly.

The C horizon varies widely in color. It ranges from sand to loam and can be gravelly, very gravelly, cobbly, or very cobbly.

Haplaquents

Haplaquents consist of deep, poorly drained and very poorly drained soils that have little profile development. These soils are in flat depressions on mountaintops at the heads of drainageways. They formed in stony glacial till. Slopes range from 0 to 3 percent.

Haplaquents commonly are near Norwich and Chippewa soils, Medisaprists, and Medihemists. They do not have the distinct horizons of the Norwich and Chippewa soils. Haplaquents are mineral soils in contrast to Medisaprists and Medihemists which are organic soils.

Because of the variability of these soils, a typical pedon is not described. Coarse fragments in individual horizons range from 0 to 80 percent. These soils are extremely acid to strongly acid.

The A horizon dominantly has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It ranges from silt loam to sandy loam and can be channery to very channery.

The C horizon varies widely in color. It ranges from loam to sandy loam and can be channery to very channery.

Holly series

Soils of the Holly series consist of fine-loamy, mixed, nonacid mesic Typic Fluvaquents. These soils are deep, and poorly drained and very poorly drained. They are on low lying floodplains that are subject to frequent flooding. Holly soils formed in alluvial deposits. Slope ranges from 0 to 2 percent.

Holly soils are on the landscape with the deep, well drained Pope soils and the deep, moderately well drained Philo soils.

Typical pedon of Holly silt loam, along Tunkhannock Creek, 1/2 mile south of Montdale, 100 feet north of Route 247:

Ap—0 to 8 inches; dark gray (10YR 4/1) silt loam; few yellowish red (5YR 4/8) mottles in root channels; weak fine granular structure; friable, slightly sticky and slightly plastic; medium acid; clear wavy boundary.

B21g—8 to 16 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct gray (10YR 5/1) mottles on ped surfaces and common medium distinct yellowish red (5YR 4/8 to 5/8) mottles in root channels; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin clay films on ped faces; medium acid; clear wavy boundary.

B22g—16 to 21 inches; light brownish gray (10YR 6/2) sandy loam; many medium distinct strong brown (7.5YR 5/8) mottles on ped surfaces and many medium distinct yellowish red (5YR 4/8) mottles in root channels; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky and slightly plastic; medium acid; abrupt smooth boundary.

B23g—21 to 40 inches; gray (5Y 5/1) sandy loam; common medium distinct reddish gray (5YR 5/2) mottles on ped surfaces and strong brown (7.5YR 5/8) and yellowish red (5YR 4/8) mottles in root channels; weak fine subangular blocky structure; friable, nonsticky and nonplastic; medium acid; abrupt smooth boundary.

IICg—40 to 60 inches; grayish (2.5Y 5/2) gravelly loamy sand; many medium distinct black (10YR 2/1), yellowish brown (10YR 5/6), and weak red (2.5YR 5/2) mottles; single grain; very friable, nonsticky and nonplastic; 20 percent coarse fragments; medium acid.

Thickness of the solum ranges from 20 to 44 inches. Depth to bedrock is more than 60 inches. Coarse fragments in the solum range from 0 to 15 percent and in the C horizon range from 0 to 40 percent. Where unlimed, this soil is slightly acid to strongly acid throughout.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1. The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, loam, or sandy loam.

The fine earth fraction of the C horizon is sandy loam and loamy sand.

Lackawanna series

Soils of the Lackawanna series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and well drained. They are on uplands on slightly convex ridges, side slopes, and mountainsides. Lackawanna soils formed in glacial till. Slope ranges from 3 to 70 percent but is dominantly 8 to 25 percent.

Lackawanna soils are on the landscape with the moderately deep Oquaga soils, the shallow Arnot soils, the deep and moderately well drained Wellsboro soils, and the somewhat poorly drained Morris soils. Lackawanna soils are similar to Bath soils, but they are reddish.

Typical pedon of Lackawanna channery loam, in an area of Lackawanna extremely stony loam, 8 to 25 percent slopes, in a woodlot 50 feet east of Highway 65053, 1/2 mile south of junction with Route T491, and 2 1/2 miles north of junction with Route 29:

O1—2 inches to 1 inch; loose leaf litter and twigs.

O2— 1 inch to 0; organic material.

A1—0 to 1 inch; dark reddish brown (5YR 3/2) channery loam; weak fine granular structure; very friable, nonsticky and nonplastic; 30 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—1 to 10 inches; reddish brown (5YR 4/4) channery loam; weak fine subangular blocky structure parting to weak fine granular; very friable, nonsticky and nonplastic; 30 percent coarse fragments; very strongly acid; clear smooth boundary.

B22—10 to 20 inches; reddish brown (5YR 4/4) channery loam; weak medium subangular blocky structure; friable, nonsticky and slightly plastic; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx1—20 to 26 inches; weak red (2.5YR 4/2) channery silt loam; weak very coarse prismatic structure part-

ing to weak fine subangular blocky; firm, nonsticky and slightly plastic; thin discontinuous clay films in pores; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx2—26 to 50 inches; weak red (2.5YR 4/2) channery silt loam; weak very coarse prismatic structure; very firm, nonsticky and slightly plastic; thin discontinuous clay films in pores; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.

C—50 to 60 inches; reddish brown (5YR 5/3) channery loam; massive; firm; 40 percent coarse fragments; strongly acid.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 48 inches. Depth to the Bx horizon ranges from 20 to 35 inches. Coarse fragments in the A horizon and in the B2 horizon range from 10 to 35 percent, and they range from 20 to 50 percent in the Bx horizon and in the C horizon. Where unlimed, this soil is very strongly acid or strongly acid above the Bx horizon and very strongly acid to medium acid in the Bx horizon and in the C horizon.

The A horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. The B2 horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. The Bx horizon and the C horizon have hue of 2.5YR to 5YR, value of 3 to 5, and chroma of 2 to 4.

The fine earth fraction of the B horizon is silt loam or loam and of the C horizon is silt loam to sandy loam.

Lordstown series

Soils of the Lordstown series consist of coarse-loamy, mixed, mesic Typic Dystrochrepts. These soils are moderately deep and well drained. They are on uplands on slightly convex ridgetops and mountainsides. Lordstown soils formed in glacial till over red and gray sandstone or shale bedrock. Slope ranges from 3 to 70 percent but is dominantly 8 to 25 percent.

Lordstown soils are on the landscape with the shallow, somewhat excessively drained Arnot soils, the deep, well drained Bath soils, and the moderately deep Oquaga soils that formed in reddish material. Lordstown soils are near the deep, moderately well drained Mardin soils and the somewhat poorly drained Volusia soils.

Typical pedon of Lordstown channery silt loam, 3 to 8 percent slopes, 1/3 mile south of Golden Hill on Route T470, 100 feet east of road, in woodland:

O1—2 inches to 1 inch; deciduous leaf litter.

O2—1 inch to 0; very dark gray (10YR 3/1) organic layer.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) channery silt loam; moderate fine granular structure; very friable, nonsticky, and nonplastic; 25 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—2 to 10 inches; brownish yellow (10YR 6/6) channery silt loam; weak fine subangular blocky structure parting to weak fine granular; friable, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B22—10 to 20 inches; pale brown (10YR 6/3) channery silt loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid; clear wavy boundary.

C—20 to 26 inches; brown (10YR 5/3) very shaly silt loam; massive; firm, nonsticky and nonplastic; 60 percent coarse fragments; strongly acid; abrupt wavy boundary.

R—26 inches; olive gray (5Y 5/2) thin bedded shale.

Thickness of the solum ranges from 20 to 36 inches. Depth to bedrock ranges from 20 to 40 inches. Coarse fragments in the solum range from 20 to 35 percent and in the C horizon range from 20 to 60 percent. Where unlimed, this soil is very strongly acid to strongly acid in the solum and strongly acid to medium acid in the C horizon.

The A1 horizon has hue of 10YR to 7.5YR, value of 2 or 3, and chroma of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. Fine earth fraction of the B horizon is silt loam or loam and of the C horizon is silt loam to sandy loam.

Mardin series

Soils of the Mardin series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They are on rolling uplands on slightly convex ridges and side slopes. Mardin soils formed in glacial till. Slope ranges from 3 to 25 percent but is dominantly 3 to 15 percent.

Mardin soils are on the landscape with the deep, well drained Bath soils and the somewhat poorly drained Volusia soils. Mardin soils are near Lordstown and Arnot soils which have bedrock within a depth of 40 inches. Mardin soils are similar to the reddish Wellsboro soils.

Typical pedon of Mardin channery silt loam, in an area of Mardin extremely stony silt loam, 8 to 25 percent slopes, 2 miles southwest of Beaumont, in woodland, 400 yards west of Route 65002, 1 mile north of junction with Route 65003:

O2—1 inch to 0; black (10YR 2/1) mat of roots under a layer of leaves and twigs.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—2 to 12 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium subanglar blocky struc-

ture parting to weak fine granular; friable, nonsticky and slightly plastic; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22—12 to 20 inches; dark brown (10YR 4/3) channery silt loam; few fine faint yellowish brown (10YR 5/4) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable, nonsticky and slightly plastic; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

Bx1—20 to 32 inches; brown (7.5YR 5/4) channery loam; few fine faint brown (10YR 5/3) mottles; weak very coarse prismatic structure parting to weak very thick platy and weak medium subangular blocky; very firm and brittle, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—32 to 60 inches; brown (7.5YR 5/4) channery loam; few fine distinct grayish brown (10YR 5/2) and dark brown (7.5YR 4/4) mottles; weak very coarse prismatic structure parting to weak very thick platy and weak medium subangular blocky; very firm and brittle, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid.

Thickness of the solum ranges from 40 to 65 inches. Depth to bedrock ranges from 48 inches to 10 feet or more. Depth to the Bx horizon ranges from 15 to 26 inches. Coarse fragments above the Bx horizon range from 15 to 30 percent and in the Bx horizon range from 20 to 50 percent. Reaction is very strongly acid to medium acid in the solum.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The B2 horizon has hue of 10YR and 7.5YR, value of 4 to 6, and chroma of 3 to 6. The Bx horizon has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 2 to 4.

The fine earth fraction of the B2 and the Bx horizons is silt loam or loam.

Medihemists

Medihemists consist of deep, very poorly drained organic soils. These soils are on broad flat mountaintops and in depressions on rolling uplands. They formed in organic material derived from partly decomposed plant remains. Slope ranges from 0 to 2 percent.

Medihemists are commonly near Medisaprists and Norwich and Chippewa soils. Norwich and Chippewa soils are mineral. Medisaprists materials are more decomposed than Medihemists.

Because of the variability of these soils, a typical pedon is not described. Medihemists have organic layers that range from 51 inches to more than 10 feet thick. Depth to bedrock is more than 60 inches. Unrubbed fiber content is more than one-third but less than two-thirds of the organic volume. These soils are extremely acid to strongly acid.

Medihemists dominantly have hue of 10YR to 5YR, value of 2 to 5, and chroma of 1 to 4. Organic material is dominantly hemic with woody, herbaceous, and sphagnum fibers.

Mineral soils or bedrock underlies the organic material.

Medisaprists

Medisaprists consist of deep, very poorly drained organic soils. These soils are on broad flat mountaintops and in depressions on rolling uplands. They formed in organic material derived from well decomposed plant remains. Slope ranges from 0 to 2 percent.

Medisaprists are commonly near Norwich and Chippewa soils and Medihemists. Norwich and Chippewa soils are mineral. Medihemists are not as decomposed as Medisaprists.

Because of the variability of these soils, a typical pedon is not described. Medisaprists have organic layers that range from 51 inches to more than 10 feet thick. Depth to bedrock is more than 60 inches. Unrubbed fiber content is less than one-third of the organic volume. These soils are extremely acid to strongly acid.

Medisaprists dominantly have hue of 10YR to 5YR, value of 2 to 5, and chroma of 1 to 4. The organic material is dominantly sapric with some woody and herbaceous fibers.

Mineral soil or bedrock underlies the organic material.

Morris series

The Morris series consists of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep and somewhat poorly drained. They are on slightly concave rolling uplands and below seep areas on steeper hillsides. Morris soils formed in glacial till. Slope ranges from 0 to 25 percent but is dominantly 0 to 8 percent. Morris soils are on the landscape with the deep, moderately well drained Wellsboro soils, the very poorly drained Norwich soils, and the moderately deep Oquaga soils.

Typical pedon of Morris channery loam, 3 to 8 percent slopes, in hayland, 1 mile north of junction of State Route 632 and Route 35059, 100 feet east of Route 35059:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) channery loam; weak fine and medium granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; medium acid; abrupt smooth boundary.

B2—10 to 15 inches; dark brown (10YR 4/3) channery loam; common medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium and thick platy and weak medium and coarse subangular blocky structure; friable, non-

sticky and nonplastic; 15 percent coarse fragments; medium acid; abrupt wavy boundary.

Bx1—15 to 28 inches; reddsih brown (5YR 4/3) gravelly loam; common medium distinct dark grayish brown (10YR 4/2) and strong brown (7.5YR 5/6) mottles, and pale red (2.5YR 6/2) and strong brown (7.5YR 5/6) prisms; moderate very coarse prismatic structure parting to moderate very thick platy and moderate medium and coarse blocky; very firm and brittle, slightly sticky and slightly plastic; few moderately thick clay films in pores; 15 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—28 to 45 inches; reddish brown (5YR 4/3) gravelly silt loam; common medium distinct dark grayish brown (10YR 4/2) and strong brown (7.5YR 5/6) mottles and pale red (2.5YR 6/2) and strong brown (7.5YR 5/6) prisms; moderate very coarse prismatic structure parting to moderate coarse blocky; very firm and brittle, slightly sticky and slightly plastic; moderately thick clay films in pores; 15 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx3—45 to 65 inches; dark brown (7.5YR 4/4) gravelly silt loam; common medium faint dark grayish brown (10YR 4/2) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium and thick platy; very firm and brittle, slightly sticky and slightly plastic; moderately thick clay films in pores; 15 percent coarse fragments; strongly acid.

Thickness of the solum ranges from 40 to 75 inches or more. Depth to bedrock is more than 60 inches. Depth to the Bx horizon is 12 to 20 inches. Coarse fragments above the Bx horizon range from 15 to 30 percent and in the Bx horizon range from 15 to 50 percent. Where unlimed, this soil is medium acid to very strongly acid in the A horizon, in the B2 horizon, and in the upper part of the Bx horizon and is strongly acid to slightly acid in the lower part of the Bx horizon and in the C horizon.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 or 4, and chroma of 2 or 3. The B2 horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4. The Bx horizon and the C horizon have hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 2 to 6.

The fine earth fraction of the B horizon and the C horizon is silt loam or loam.

Norwich series

Soils of the Norwich series consists of fine-loamy, mixed, mesic Typic Fragiaquepts. These soils are deep and very poorly drained. They are on uplands on slightly concave heads of drainageways and in slight depressions where runoff accumulates. Norwich soils formed in glacial till. Slope ranges from 0 to 8 percent but is dominantly 0 to 3 percent.

Norwich soils are on the landscape with the deep and poorly drained Chippewa soils and the somewhat poorly drained Volusia and Morris soils.

Typical pedon of Norwich channery silt loam, in an area of Norwich and Chippewa channery silt loams, 0 to 3 percent slopes, in a woodlot 1/2 mile east of Route 65058, 1/3 mile north of Route T414:

O1—4 to 3 inches; loose leaf litter.

O2—3 inches to 0; black (N 2/0) organic layer.

A1—0 to 2 inches; dark gray (10YR 4/1) channery silt loam; moderate fine granular structure; very friable, slightly sticky and slightly plastic; 15 percent coarse fragments; strongly acid; clear smooth boundary.

A2g—2 to 4 inches; gray (10YR 5/1) channery silt loam; weak medium subangular blocky structure parting to weak medium granular; friable, slightly sticky and slightly plastic; 15 percent coarse fragments; medium acid; clear wavy boundary.

B2g—4 to 12 inches; gray (5Y 6/1) channery silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium and fine subangular blocky structure; friable, slightly sticky and plastic; few thin continuous silt films in pores; 15 percent coarse fragments; medium acid; clear wavy boundary.

Bx1—12 to 24 inches; brown (7.5YR 5/2) channery silt loam; many medium faint dark gray (N 4/0) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to weak medium subangular blocky; very firm and brittle, sticky and plastic; thin continuous silt films in pores; 15 percent coarse fragments; medium acid; clear wavy boundary.

Bx2—24 to 48 inches; brown (7.5YR 5/2) channery silt loam; few medium faint dark gray (N 4/0) and brown (7.5YR 5/4) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm, slightly sticky and plastic; 15 percent coarse fragments; medium acid; abrupt smooth boundary.

C—48 to 65 inches; reddish brown (5YR 4/3) channery loam; common distinct brown (7.5YR 5/4) and gray (10YR 5/1) mottles; weak thick platy structure; firm, nonsticky and slightly plastic; 25 percent coarse fragments; medium acid.

Thickness of the solum ranges from 36 to 50 inches. Depth to bedrock is more than 60 inches. Depth to the Bx horizon ranges from 10 to 18 inches. Coarse fragments above the Bx horizon range from 15 to 25 percent and in the Bx horizon and in the C horizon range from 15 to 40 percent. Where unlimed, this soil is strongly acid or medium acid throughout.

The A1 horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 or 2. The A2g horizon and the B2g horizon have hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 or 2. The Bx horizon and the C horizon

have hue of 7.5YR to 5YR, value of 4 or 5, and chroma of 1 to 3.

The B2g horizon is channery silt loam or channery loam. The Bx horizon and the C horizon are channery silt loam, channery loam, or channery sandy loam.

Oquaga series

Soils of the Oquaga series consist of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are moderately deep and somewhat excessively drained. They are on rolling uplands, mountainsides, and ridgetops. Oquaga soils formed in glacial till. Slope ranges from 3 to 70 percent but is dominantly 8 to 25 percent.

Oquaga soils are on the landscape with the shallow, somewhat excessively drained Arnot soils, the deep, somewhat poorly drained Morris soils, and the deep, well drained Lackawanna soils. Oquaga soils are similar to Lordstown soils but are reddish.

Typical pedon of Oquaga channery loam, in an area of Oquaga extremely stony loam, 8 to 25 percent slopes, 1 mile south of junction of State Routes 348 and T334, 1/4 mile west of road, in woodland:

O1—4 1/2 to 1 1/2 inches; hardwood leaf litter and twigs; very strongly acid; abrupt smooth boundary.

O2—1 1/2 inches to 0; black (10YR 2/1) partly decomposed material; very strongly acid; abrupt smooth boundary.

A1—0 to 2 inches; dark reddish brown (5YR 3/2) channery loam; weak medium platy structure parting to weak fine granular; very friable, nonsticky and nonplastic; 40 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B2—2 to 15 inches; reddish brown (5YR 5/4) channery loam; weak medium subangular blocky structure parting to weak fine and medium granular; very friable, nonsticky and nonplastic; 45 percent coarse fragments; very strongly acid; gradual wavy boundary.

C—15 to 25 inches; reddish brown (2.5YR 4/4) very channery silt loam; massive; friable to loose, nonsticky and nonplastic; 80 percent coarse fragments; very strongly acid; gradual wavy boundary.

R—25 inches; dusky red (10R 3/2) fractured sandstone and shale bedrock.

Thickness of the solum ranges from 15 to 35 inches. Depth to bedrock is 20 to 40 inches. Coarse fragments in the solum range from 30 to 50 percent and in the C horizon range from 40 to 80 percent. Where unlimed, this soil is very strongly acid to medium acid throughout.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. The B horizon and the C horizon have hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4.

The fine earth fraction of the B horizon and the C horizon is silt loam or loam.

Philo series

Soils of the Philo series consist of coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts. These soils are deep and moderately well drained. They are on flood plains. Philo soils formed in alluvial sediment from stream overflow. Slope is 0 to 2 percent.

Philo soils are on the landscape with the deep, well drained Pope soils and the deep, somewhat excessively drained Wyoming soils. Philo soils formed in alluvial sediment and are subject to stream overflow, whereas Wyoming soils formed in gravelly glacial outwash and are not subject to stream overflow.

Typical pedon of Philo silt loam, in cropland, 700 feet south of junction of Routes 92 and T394, 100 feet north of the riverbank:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak very fine granular structure; very friable, nonsticky and nonplastic; neutral; abrupt smooth boundary.

B21—8 to 13 inches; dark brown (10YR 4/3) silt loam; weak medium and fine subangular blocky structure; friable, nonsticky and nonplastic; slightly acid; clear wavy boundary.

B22—13 to 22 inches; dark brown (10YR 4/3) loam; few fine faint pale brown (10YR 6/3) mottles; weak fine and very fine subangular blocky structure; friable, nonsticky and nonplastic; slightly acid; gradual wavy boundary.

B23—22 to 32 inches; dark brown (10YR 4/3) loam; common medium distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium and fine subangular blocky structure; friable, nonsticky and nonplastic; slightly acid; gradual wavy boundary.

C1—32 to 44 inches; dark grayish brown (2.5Y 4/2) loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; firm, nonsticky and slightly plastic; strongly acid; clear wavy boundary.

C2—44 to 60 inches; dark gray (10YR 4/1) silt loam; common medium distinct yellowish red (5YR 4/6) and common medium faint pinkish gray (5YR 6/2) mottles; massive; firm, nonsticky and slightly plastic; strongly acid.

Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is more than 60 inches. Coarse fragments in the solum range from 0 to 10 percent and in the C horizon range from 0 to 30 percent. Where unlimed, this soil is very strongly acid to medium acid throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 7.5YR and 10YR, value of 4 or 5, and chroma of 3 to 6. The C

horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 1 or 2.

The fine earth fraction of the B horizon is silt loam or loam and of the C horizon is silt loam to fine sandy loam.

Pope series

Soils of the Pope series consist of coarse-loamy, mixed, mesic Fluventic Dystrochrepts. These soils are deep and well drained. They are on flat to slightly convex flood plains. Pope soils formed in alluvial deposits. Slope is 0 to 2 percent.

Pope soils are on the landscape with the moderately well drained Philo soils and the somewhat excessively drained Wyoming soils. Pope soils formed in alluvial sediment and are subject to stream overflow, whereas Wyoming soils formed in gravelly glacial outwash at higher elevations and are not subject to stream overflow.

Typical pedon of Pope fine sandy loam, in an area of Pope soils, rarely flooded, Rivercrest subdivision, 2.5 miles south of Tunkhannock, 500 feet south of Route 92:

Ap—0 to 11 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable, nonsticky, and nonplastic; medium acid; abrupt smooth boundary.

B21—11 to 16 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium and fine subangular blocky structure; friable, nonsticky and nonplastic; medium acid; gradual wavy boundary.

B22—16 to 37 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse subangular blocky structure; friable, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

IIC—37 to 60 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose, nonsticky and nonplastic; very strongly acid.

Thickness of the solum ranges from 30 to 45 inches. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 10 percent throughout. Where unlimed, this soil is very strongly acid or strongly acid throughout. The solum is silt loam, loam, or sandy loam. The C horizon is sandy loam or loamy sand.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon and the C horizon have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

Rexford series

Soils of the Rexford series consist of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep and somewhat poorly drained and poorly drained. They are in slight depressions on stream terraces. Rexford soils formed in glacial outwash deposits. Slope ranges from 0 to 5 percent.

Rexford soils are on the landscape with the moderately well drained Braceville soils, the somewhat excessively drained Wyoming soils, and the very poorly drained Atherton soils.

Typical pedon of Rexford loam, 0 to 5 percent slopes, in cropland, 1 mile south of Laceyville along Route 65041, 100 feet west of highway:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable, nonsticky and nonplastic; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—9 to 14 inches; dark yellowish brown (10YR 4/4) gravelly loam; many medium distinct dark grayish brown (2.5Y 4/2) mottles; moderate coarse subangular blocky structure; slightly firm, nonsticky and nonplastic; 25 percent coarse fragments; slightly acid; clear smooth boundary.

B22—14 to 21 inches; light brownish gray (10YR 6/2) fine sandy loam; few fine faint dark brown (10YR 4/3) mottles; weak coarse subangular blocky structure; slightly firm, nonsticky and nonplastic; 10 percent coarse fragments; medium acid; clear smooth boundary.

Bx1—21 to 30 inches; light brownish gray (10YR 6/2) loam; few fine faint yellowish brown (10YR 5/4) mottles; moderate very coarse prismatic structure parting to weak very thick platy; firm, slightly sticky and slightly plastic; 10 percent coarse fragments; medium acid; clear smooth boundary.

Bx2—30 to 40 inches; dark brown (10YR 4/3) fine sandy loam; few fine faint light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to weak very thick platy; firm, slightly sticky and slightly plastic; 10 percent coarse fragments; medium acid; abrupt wavy boundary.

IIC—40 to 60 inches; brown (10YR 5/3) loamy fine sand; massive; slightly firm, nonsticky and nonplastic; medium acid.

Thickness of the solum ranges from 24 to 44 inches. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 15 to 24 inches. Coarse fragments in the solum range from 0 to 20 percent and in the C horizon range from 0 to 40 percent. Where unlimed, this soil is strongly acid and medium acid throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 1 or 2. The B2 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and dominant chroma of 2 and individual horizons with chroma of 3 or 4. The Bx horizon and the C horizon have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 4.

The fine earth fraction of the B horizon is loam, silt loam, or sandy loam and of the C horizon is loam to sandy loam to stratified sand and gravel.

Swartswood series

Soils of the Swartswood series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and well drained. They are on slightly convex ridgetops and side slopes. Swartswood soils formed in medium to moderately coarse textured glacial till. Slope ranges from 3 to 25 percent.

Swartswood soils are on the landscape with the shallow Arnot soils, the moderately well drained Wurtsboro soils, and Dystrochrepts and Rock outcrop.

Typical pedon of Swartswood channery loam, in an area of Swartswood extremely stony loam, 8 to 25 percent slopes, in woodland 50 yards east of Route T530, 1 mile south from its junction with Route 438:

O2—1 inch to 0; black (10YR 2/1) root mat; very strongly acid.

A1—0 to 4 inches; dark brown (10YR 3/3) channery loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 25 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—4 to 7 inches; yellowish brown (10YR 5/6) channery loam; weak fine granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B22—7 to 24 inches; dark brown (10YR 4/3) channery sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 15 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx1—24 to 38 inches; dark brown (10YR 4/3) gravelly loam; common fine faint light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm and brittle, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid; gradual wavy bounday.

Bx2—38 to 56 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; common medium faint light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm and brittle, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

C—56 to 65 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; massive; friable, nonsticky and nonplastic; 35 percent coarse fragments; strongly acid.

Thickness of the solum ranges from 40 to 65 inches. Depth to bedrock is 60 inches or more. Depth to the fragipan is 22 to 36 inches. Coarse fragments above the fragipan range from 5 to 40 percent and in the fragipan and in the C horizon range from 15 to 50 percent. Where unlimed, this soil is very strongly acid and strongly acid throughout.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons have a thin A2 horizon. The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The Bx horizon and the C horizon have hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 6.

The fine earth fraction is loam or sandy loam in the B and C horizons.

Udorthents

Udorthents consist of deep, well drained to somewhat poorly drained soils. These soils are on uplands on ridges and side slopes in areas that have been strip mined. They formed in disturbed material derived from upland glacial till. Slope ranges from 0 to 80 percent but is dominantly 25 to 60 percent.

Udorthents commonly are near Urban land; Dumps, mine; and Wellsboro, Morris, and Arnot soils. They do not have the distinct horizons of the Wellsboro, Morris, and Arnot soils. Udorthents do not have a high percentage of coal material as have Dumps, mine, and are not covered with construction as is Urban land.

Because of the variability of these soils, a typical pedon is not described. Depth to bedrock is more than 48 inches. Coarse fragments in individual horizons range from 15 to 50 percent. These soils are extremely acid to medium acid.

The A horizon is 0 to 4 inches thick. It dominantly has hue of 10YR and 7.5YR, value of 2 to 5, and chroma of 2 to 6. It ranges from loam to silt loam and is channery to very channery.

The C horizon varies widely in color. It ranges from loam to silt loam and is channery to very channery.

Unadilla series

Soils of the Unadilla series consist of coarse-silty, mixed, mesic Typic Dystrochrepts. These soils are deep and well drained. They are on rolling topography in the transitional area between the gravelly soils on terraces and the soils on uplands. Unadilla soils formed in windblown deposits of silt and very fine sand. Slope ranges from 3 to 15 percent.

Unadilla soils are on the landscape with the deep, somewhat excessively drained Wyoming soils; the deep, moderately well drained Mardin soils; and the moderately deep, well drained Lordstown soils. Unadilla soils contain less coarse fragments than the Wyoming soils and do not have the fragipan of the Mardin soils.

Typical pedon of Unadilla silt loam, 8 to 15 percent slopes, in an idle field, 1 1/2 miles west of Meshoppen on Route 6, 50 feet south of highway:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak medium granular structure; very friable, non-

sticky, and slightly plastic; medium acid; abrupt smooth boundary.

B21—8 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine and medium subangular blocky structure; friable, nonsticky, and nonplastic; strongly acid; gradual wavy boundary.

B22—14 to 33 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable, nonsticky and slightly plastic; few bleached sand grains on ped faces; weak stratification; strongly acid; gradual wavy boundary.

C—33 to 60 inches; yellowish brown (10YR 5/4) and dark brown (7.5YR 4/4) very fine sandy loam; massive; friable, nonsticky and slightly plastic; weak thin stratification; strongly acid.

Thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 60 inches. Coarse fragments in the solum range from 0 to 5 percent. Where unlimed, the solum is very strongly acid to medium acid and the C horizon is strongly acid to slightly acid.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon and the C horizon have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4.

The B horizon is silt loam, and the C horizon is silt loam or very fine sandy loam.

Volusia series

Soils of the Volusia series consist of fine-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep and somewhat poorly drained. They formed in glacial till. Slope ranges from 0 to 25 percent but is dominantly 0 to 15 percent.

Volusia soils are on the landscape with the moderately well drained Mardin soils, the poorly drained Chippewa soils, and the very poorly drained Norwich soils. They are also with the Morris soils but are not reddish as are the Morris soils. Volusia soils are slightly more clayey than the Morris soils.

Typical pedon of Volusia channery silt loam, in an area of Volusia extremely stony silt loam, 0 to 8 percent slopes, in a woodland 100 yards north of the intersection of Routes 65044 and T459:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 30 percent coarse fragments; medium acid; gradual wavy boundary.

B2—4 to 12 inches; brown (10YR 5/3) channery silt loam; few fine distinct strong brown (7.5YR 5/6) mottles and few fine faint light brownish gray (10YR 6/2) mottles; moderate medium and fine subangular blocky structure; friable, nonsticky, and slightly plastic; strongly acid; clear wavy boundary.

Bx1—12 to 24 inches; dark grayish brown (10YR 4/2) channery loam; common medium distinct strong brown (7.5YR 5/6) mottles and common medium faint light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; firm and brittle, nonsticky and nonplastic; thin clay lining in pores; 30 percent coarse fragments; medium acid; clear wavy boundary.

Bx2—24 to 42 inches; brown (10YR 5/3) channery loam; many medium distinct strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak very thick platy; very firm and brittle, nonsticky and nonplastic; thin clay lining in pores; 30 percent coarse fragments; medium acid; gradual smooth boundary.

Bx3—42 to 60 inches; brown (10YR 5/3) channery loam; few medium distinct strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure; firm and brittle, nonsticky and nonplastic; thin clay lining in pores; 30 percent coarse fragments; medium acid.

Thickness of the solum ranges from 40 to 65 inches. Depth to bedrock is more than 60 inches. Depth to the Bx horizon is 12 to 20 inches. Coarse fragments above the Bx horizon range form 15 to 35 percent and in the Bx horizon and C horizon range from 20 to 50 percent. Where unlimed, this soil is very strongly acid to medium acid above the Bx horizon, strongly acid to slightly acid in the Bx horizon, and medium acid and slightly acid in the C horizon.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B2 horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The Bx horizon and the C horizon have hue of 10YR, value of 3 to 5, and chroma of 2 or 3.

The fine earth fraction of the B horizon and the C horizon is silt loam or loam.

Wellsboro series

Soils of the Wellsboro series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They are on slightly convex ridges and broad rolling uplands. Wellsboro soils formed in glacial till. Slope ranges from 3 to 25 percent but is dominantly 3 to 15 percent.

Wellsboro soils are on the landscape with the deep, well drained Lackawanna soils and the somewhat poorly drained Morris soils. They are near the moderately deep Oquaga soils and the shallow Arnot soils.

Typical pedon of Wellsboro channery loam, in an area of Wellsboro extremely stony loam, 3 to 8 percent slopes, in woodland 2 miles north of Stowell, 200 yards east of Route T470:

A1—0 to 2 inches; dark reddish brown (5YR 3/2) channery loam; weak fine granular structure; very friable,

nonsticky and nonplastic; 30 percent coarse fragments; very strongly acid; abrupt smooth boundary.

A2—2 to 3 inches; reddish gray (5YR 5/2) channery fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; 25 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—3 to 19 inches; brown (7.5YR 5/4) channery loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

B22—19 to 23 inches; dark brown (7.5YR 4/4) channery loam; few fine faint pinkish gray (7.5YR 6/2) mottles; weak coarse subangular blocky structure parting to weak medium and fine subangular blocky; firm, nonsticky and slightly plastic; 25 percent coarse fragments; strongly acid; clear wavy boundary.

Bx1—23 to 29 inches; reddish brown (5YR 4/4) channery silt loam; few fine distinct pinkish gray (7.5YR 6/2) mottles; weak coarse prismatic structure parting to weak thick platy; very firm and brittle, nonsticky and nonplastic; 20 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—29 to 44 inches; reddish brown (5YR 4/3) channery silt loam; many medium distinct pinkish gray (7.5YR 6/2) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; very firm and brittle, nonsticky and slightly plastic; 25 percent coarse fragments; strongly acid; gradual smooth boundary.

Bx3—44 to 60 inches; reddish brown (5YR 4/3) channery loam; weak very coarse prismatic structure; weak red (2.5YR 5/2) prism faces; very firm and brittle, nonsticky and nonplastic; 30 percent coarse fragments; strongly acid.

Thickness of the solum ranges from 40 to 65 inches. Depth to bedrock is more than 48 inches. Depth to the Bx horizon is 15 to 26 inches. Coarse fragments above the Bx horizon range from 15 to 35 percent and in the Bx horizon and in the C horizon range from 15 to 50 percent. Where unlimed, this soil is very strongly acid to medium acid throughout.

The A1 horizon has hue of 7.5YR or 5YR, value of 2 to 4, and chroma of 2. Some pedons have an A2 horizon. The B2 horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 or 6. The Bx horizon and the C horizon have hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4.

The fine earth fraction of the B2 horizon is silt loam or loam and of the Bx horizon and the C horizon is silt loam to sandy loam.

Wurtsboro series

Soils of the Wurtsboro series consist of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They are on slightly convex ridges. Wurtsboro soils formed in glacial till. Slope ranges from 3 to 25 percent but is dominantly 3 to 15 percent.

Wurtsboro soils are on the landscape with the deep, well drained Swartswood soils; the moderately deep, well drained Lordstown soils; and the deep, moderately well drained Mardin and Wellsboro soils. Wurtsboro soils are coarser textured throughout than Mardin and Wellsboro soils.

Typical pedon of Wurtsboro channery loam, in an area of Wurtsboro extremely stony loam, 8 to 25 percent slopes, in woodland, 1/2 mile southeast of Glenwood Lake, 380 yards west of creek, in pit:

O2—1 inch to 0; black (10YR 2/1) root mat.

A1—0 to 1 inch; black (10YR 2/1) channery loam; weak coarse granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; extremely acid; abrupt smooth boundary.

A2—1 inch to 2 inches; grayish brown (10YR 5/2) channery loam; weak fine granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; strongly acid; abrupt wavy boundary.

B21—2 to 8 inches; yellowish brown (10YR 5/6) channery loam; weak coarse subangular blocky structure; very friable, slightly sticky and slightly plastic; 15 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—8 to 16 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; 15 percent coarse fragments; very strongly acid; clear wavy boundary.

B23—16 to 21 inches; yellowish brown (10YR 5/6) gravelly loam; few fine distinct light yellowish brown (2.5Y 6/4) mottles and few fine faint yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 15 percent coarse fragments; very strongly acid; abrupt wavy boundary.

Bx1—21 to 40 inches; dark grayish brown (2.5Y 4/2) gravelly sandy loam; few fine distinct pale brown (10YR 6/3) and brownish yellow (10YR 6/6) mottles; weak very coarse prismatic structure; firm and brittle, nonsticky and nonplastic; 20 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx2—40 to 60 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; common medium distinct light brownish gray (2.5Y 6/2) and brownish yellow (10YR 6/8) mottles; moderate coarse prismatic structure; firm and brittle, nonsticky and nonplastic; 30 percent coarse fragments; very strongly acid.

Thickness of the solum ranges from 40 to 65 inches. Depth to bedrock is 60 inches or more. Depth to the Bx horizon ranges from 17 to 28 inches. Coarse fragments

above the Bx horizon range from 0 to 35 percent. In the Bx horizon and in the C horizon, they range from 10 to 50 percent. Where unlimed, this soil is extremely acid to strongly acid throughout.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The A2 horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The B2 horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. The Bx horizon and the C horizon have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The fine earth fraction of the B horizon and the C horizon is loam or sandy loam.

Wyoming series

Soils of the Wyoming series consist of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep and somewhat excessively drained. They are on stream terraces. Wyoming soils formed in stratified glacial outwash material. Slope ranges from 0 to 45 percent but is dominantly 3 to 25 percent.

Wyoming soils are on the landscape with the moderately well drained Braceville soils and the somewhat poorly drained and poorly drained Rexford soils. Wyoming soils are also with the Unadilla soils but contain more sand and gravel in the profile than Unadilla soils.

Typical pedon of Wyoming gravelly sandy loam, 3 to 8 percent slopes, 2 1/2 miles east of Mehoopany, 2 miles east of intersection of Routes 65006 and T435, 100 feet west of the road:

Ap—0 to 7 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; 35 percent gravel; very strongly acid; abrupt smooth boundary.

B2—7 to 15 inches; dark brown (7.5YR 4/4) very gravelly sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 50 percent gravel; very strongly acid; gradual wavy boundary.

B3—15 to 25 inches; dark brown (7.5YR 4/4) very gravelly coarse sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 60 percent gravel; very strongly acid; gradual wavy boundary.

C—25 to 60 inches; brown (10YR 4/3) very gravelly loamy coarse sand; lenses of sand and gravel; single grain; loose, nonsticky and nonplastic; 65 percent coarse fragments; very strongly acid.

Thickness of the solum ranges from 20 to 35 inches. Depth to bedrock is 10 feet or more. Coarse fragments in the A horizon range from 15 to 50 percent, in the B horizon, from 35 to 60 percent; and in the C horizon, from 35 to 75 percent. Where unlimed, this soil is extremely acid to medium acid throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. The B horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has colors similar to the B horizon, but the C horizon also has chroma of 2.

The fine earth fraction of the B horizon is sandy loam and of the C horizon is sandy loam to sand.

References

(1) American Association of State Highway and Transportation Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Cunningham, R. L., G. W. Petersen, R. W. Ranney, and R. P. Matelski. 1969. Characteristics, interpretations and uses of Pennsylvania soils—Northampton County. Pa. State Univ. Prog. Rep. 295, 40 pp.

(4) Cunningham, R. L., G. W. Petersen, R. P. Matelski, R. W. Ranney, and E. J. Ciolkosz. 1972. Laboratory characterization data and field descriptions of selected Pennsylvania soils. Pa. State Univ., Agron. Dep. Agron. Ser. 25, 805 pp.

(5) Hunt, Charles B. 1976. Physiography of the United States. W. H. Freeman Co., 480 pp., illus.

(6) Itter, Harry A. 1959. The geomorphology of the Wyoming-Lackawanna region. Pa. Topog. and Geol. Surv. Bull. G9.

(7) Pennsylvania Department of Agriculture. 1975. Crop and livestock annual summary. Pa. Crop Rep. Surv.

(8) Pennsylvania Geological Survey. Ground water in northwestern Pennsylvania. Pa. Geol. Surv. Bull. W-4.

(9) Society of American Foresters. 1954. Forest cover types of North America. Rep. Comm. Forest Types, 67 pp.

(10) United States Department of Agriculture. 1938. Soils and men. U.S. Dep. Agric. Yearb., 1232 pp., illus.

(11) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(12) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210. 21 pp.

(13) United States Department of Agriculture. 1968. The timber resources of Pennsylvania. Forest Serv. Resour. Bull. E-8.

(14) United States Department of Agriculture. 1969. Soil survey of Pike County, Pennsylvania. U.S. Dep. Agric., Soil Conserv. Ser. pp. 71-74, illus.

(15) United States Department of Agriculture. 1973. Soil survey of Susquehanna County, Pennsylvania. U.S. Dep. Agric., Soil Conserv. Ser. pp. 77-84, illus.
(16) United States Department of Agriculture. 1974. Soil survey of Northampton County, Pennsylvania. U.S. Dep. Agric., Soil Conserv. Ser. pp. 109-112, illus.
(17) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	Less than 2.4
Low	2.4 to 3.2
Moderate	3.2-5.2
High	More than 5.2

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex, slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of

grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount

of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The

chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Pitting. Formation of pits as a result of the melting of ground ice after the removal of plant cover.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1941-70 at Scranton, Pa.]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with--		Average monthly total	One year in 10 will have--		Days with snow cover	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than--	Minimum temperature equal to or lower than--		Less than--	More than--		
	°F	°F	°F	°F	In	In	In		In
January---	34.6	19.0	50	1	2.07	0.81	3.22	16	4
February--	36.2	19.7	51	4	1.95	1.00	2.97	14	5
March-----	45.6	27.5	65	13	2.63	1.30	3.21	7	3
April-----	59.5	38.2	79	26	3.42	1.52	4.77	1	2
May-------	70.7	47.7	86	36	3.79	1.95	6.73	0	0
June------	79.8	56.6	91	46	3.42	1.64	5.43	0	0
July------	83.8	61.2	93	51	4.34	1.54	7.07	0	0
August----	81.7	58.9	92	48	3.78	1.58	5.71	0	0
September-	74.5	52.4	88	38	2.90	.90	4.60	0	0
October---	64.3	42.3	80	31	2.81	1.41	4.50	0	0
November--	50.2	33.5	65	22	2.98	1.47	4.70	1	2
December--	37.4	22.8	54	7	2.48	1.22	3.90	11	3
Year----	59.9	40.0	96	-3	36.57	27.28	41.59	50	4

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1941-70 at Scranton, Pa.]

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than--	Mar. 29	Apr. 5	Apr. 13	Apr. 27	May 11
2 years in 10 later than--	Mar. 22	Mar. 31	Apr. 8	Apr. 21	May 6
5 years in 10 later than--	Mar. 12	Mar. 21	Mar. 29	Apr. 11	Apr. 24
Fall:					
1 year in 10 earlier than--	Nov. 21	Nov. 13	Nov. 2	Oct. 19	Sep. 28
2 years in 10 earlier than--	Nov. 26	Nov. 18	Nov. 7	Oct. 24	Oct. 3
5 years in 10 earlier than--	Dec. 5	Nov. 27	Nov. 17	Nov. 2	Oct. 14

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Lackawanna County	Wyoming County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
ArC	Arnot very channery silt loam, very rocky, 3 to 15 percent slopes	4,014	9,714	13,728	2.5
AsB	Arnot-Rock outcrop complex, 0 to 8 percent slopes	3,859	523	4,382	0.8
AsD	Arnot-Rock outcrop complex, 8 to 25 percent slopes	12,915	5,155	18,070	3.3
ASE	Arnot-Rock outcrop complex, steep	8,958	4,741	13,699	2.5
At	Atherton loam, ponded	401	205	606	0.1
BaB	Bath channery silt loam, 3 to 8 percent slopes	526	1,054	1,580	0.3
BaC	Bath channery silt loam, 8 to 15 percent slopes	511	2,038	2,549	0.5
BaD	Bath channery silt loam, 15 to 25 percent slopes	447	2,253	2,700	0.5
BbB	Bath extremely stony silt loam, 3 to 8 percent slopes	2,604	488	3,092	0.6
BbD	Bath extremely stony silt loam, 8 to 25 percent slopes	3,598	3,726	7,324	1.3
BcB	Braceville gravelly loam, 2 to 6 percent slopes	173	762	935	0.2
Da	Dumps, mine	4,989	0	4,989	0.9
Db	Dumps, burned mine	306	0	306	*
DYD	Dystrochrepts and Rock outcrop, moderately steep	10,447	1,278	11,725	2.2
DYE	Dystrochrepts and Rock outcrop, steep	8,741	735	9,476	1.7
FA	Fluvents and Fluvaquents	1,333	2,984	4,317	0.8
HA	Haplaquents, stony	0	1,445	1,445	0.3
Hm	Holly silt loam	1,851	1,296	3,147	0.6
Ho	Holly silt loam, ponded	1,711	365	2,076	0.4
LaB	Lackawanna channery loam, 3 to 8 percent slopes	785	993	1,778	0.3
LaC	Lackawanna channery loam, 8 to 15 percent slopes	870	2,838	3,708	0.7
LaD	Lackawanna channery loam, 15 to 25 percent slopes	798	3,978	4,776	0.9
LbB	Lackawanna extremely stony loam, 3 to 8 percent slopes	1,362	252	1,614	0.3
LbD	Lackawanna extremely stony loam, 8 to 25 percent slopes	4,053	4,866	8,919	1.6
LCE	Lackawanna and Bath extremely stony loams, steep	2,759	15,967	18,726	3.4
LeB	Lordstown channery silt loam, 3 to 8 percent slopes	525	1,132	1,657	0.3
LeC	Lordstown channery silt loam, 8 to 15 percent slopes	465	1,721	2,186	0.4
LeD	Lordstown channery silt loam, 15 to 25 percent slopes	879	1,299	2,178	0.4
LfB	Lordstown flaggy silt loam, 3 to 8 percent slopes	255	689	944	0.2
LfC	Lordstown flaggy silt loam, 8 to 15 percent slopes	381	613	994	0.2
LxB	Lordstown extremely stony silt loam, 3 to 8 percent slopes	2,227	1,504	3,731	0.7
LxD	Lordstown extremely stony silt loam, 8 to 25 percent slopes	8,426	6,445	14,871	2.7
McB	Mardin channery silt loam, 3 to 8 percent slopes	1,206	5,434	6,640	1.2
McC	Mardin channery silt loam, 8 to 15 percent slopes	1,235	5,755	6,990	1.3
McD	Mardin channery silt loam, 15 to 25 percent slopes	817	1,570	2,387	0.4
MfB	Mardin flaggy silt loam, 3 to 8 percent slopes	530	891	1,421	0.3
MfC	Mardin flaggy silt loam, 8 to 15 percent slopes	703	1,625	2,328	0.4
MhB	Mardin extremely stony silt loam, 3 to 8 percent slopes	3,356	2,703	6,059	1.1
MhD	Mardin extremely stony silt loam, 8 to 25 percent slopes	3,829	3,749	7,578	1.4
MK	Medisaprists and Medihemists	2,103	1,460	3,563	0.7
MrA	Morris channery loam, 0 to 3 percent slopes	1,453	462	1,915	0.4
MrB	Morris channery loam, 3 to 8 percent slopes	11,525	5,467	16,992	3.1
MrC	Morris channery loam, 8 to 18 percent slopes	4,782	4,573	9,355	1.7
MsB	Morris flaggy loam, 3 to 8 percent slopes	3,425	2,837	6,262	1.2
MsC	Morris flaggy loam, 8 to 15 percent slopes	1,637	1,017	2,654	0.5
MxB	Morris extremely stony loam, 0 to 8 percent slopes	8,859	7,458	16,317	3.0
MxD	Morris extremely stony loam, 8 to 25 percent slopes	2,439	990	3,429	0.6
NcA	Norwich and Chippewa channery silt loams, 0 to 3 percent slopes	2,705	2,370	5,075	0.9
NcB	Norwich and Chippewa channery silt loams, 3 to 8 percent slopes	1,960	1,327	3,287	0.6
NxB	Norwich and Chippewa extremely stony silt loams, 0 to 8 percent slopes	12,707	7,685	20,392	3.7
OcB	Oquaga channery loam, 3 to 8 percent slopes	1,802	1,115	2,917	0.5
OcC	Oquaga channery loam, 8 to 15 percent slopes	1,825	1,890	3,715	0.7
OcD	Oquaga channery loam, 15 to 25 percent slopes	1,806	3,083	4,889	0.9
OfB	Oquaga flaggy loam, 3 to 8 percent slopes	1,353	440	1,793	0.3
OfC	Oquaga flaggy loam, 8 to 15 percent slopes	1,860	662	2,522	0.5
OxB	Oquaga extremely stony loam, 3 to 8 percent slopes	3,273	4,689	7,962	1.5
OxD	Oquaga extremely stony loam, 8 to 25 percent slopes	12,920	10,878	23,798	4.4
OYE	Oquaga and Lordstown extremely stony loams, steep	8,796	25,192	33,988	6.2
Ph	Philo silt loam	626	1,297	1,923	0.4
Pk	Pits, gravel	190	265	455	0.1
Po	Pope soils	659	608	1,267	0.2
Pp	Pope soils, rarely flooded	255	3,624	3,879	0.7
Qu	Quarries	205	126	331	*
ReA	Rexford loam, 0 to 5 percent slopes	324	845	1,169	0.2
SwB	Swartswood channery loam, 3 to 8 percent slopes	1,103	61	1,164	0.2

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Lackawanna County	Wyoming County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
SwC	Swartswood channery loam, 8 to 15 percent slopes	1,744	194	1,938	0.4
SwD	Swartswood channery loam, 15 to 25 percent slopes	414	155	569	0.1
SxB	Swartswood extremely stony loam, 3 to 8 percent slopes	2,157	161	2,318	0.4
SxD	Swartswood extremely stony loam, 8 to 25 percent slopes	4,461	422	4,883	0.9
UA	Udorthents, strip mine	12,573	0	12,573	2.3
UnB	Unadilla silt loam, 3 to 8 percent slopes	0	795	795	0.1
UnC	Unadilla silt loam, 8 to 15 percent slopes	0	652	652	0.1
Ur	Urban land	13,422	271	13,693	2.5
Us	Urban land, occasionally flooded	744	0	744	0.1
VcA	Volusia channery silt loam, 0 to 3 percent slopes	1,260	733	1,993	0.4
VcB	Volusia channery silt loam, 3 to 8 percent slopes	4,591	4,482	9,073	1.7
VcC	Volusia channery silt loam, 8 to 18 percent slopes	2,272	2,732	5,004	0.9
VfB	Volusia flaggy silt loam, 3 to 8 percent slopes	1,903	824	2,727	0.5
VfC	Volusia flaggy silt loam, 8 to 15 percent slopes	685	806	1,491	0.3
VxB	Volusia extremely stony silt loam, 0 to 8 percent slopes	8,900	2,981	11,881	2.2
VxD	Volusia extremely stony silt loam, 8 to 25 percent slopes	1,666	716	2,382	0.4
WcB	Wellsboro channery loam, 3 to 8 percent slopes	4,415	5,495	9,910	1.8
WcC	Wellsboro channery loam, 8 to 15 percent slopes	6,260	8,751	15,011	2.8
WcD	Wellsboro channery loam, 15 to 25 percent slopes	2,438	4,002	6,440	1.2
WfB	Wellsboro flaggy loam, 3 to 8 percent slopes	1,169	809	1,978	0.4
WfC	Wellsboro flaggy loam, 8 to 15 percent slopes	2,054	2,033	4,087	0.8
WgB	Wellsboro extremely stony loam, 3 to 8 percent slopes	4,742	2,868	7,610	1.4
WgD	Wellsboro extremely stony loam, 8 to 25 percent slopes	8,559	8,650	17,209	3.2
WkB	Wurtsboro channery loam, 3 to 8 percent slopes	1,824	118	1,942	0.4
WkC	Wurtsboro channery loam, 8 to 15 percent slopes	824	121	945	0.2
WxB	Wurtsboro extremely stony loam, 3 to 8 percent slopes	1,252	160	1,412	0.3
WxD	Wurtsboro extremely stony loam, 8 to 25 percent slopes	1,085	14	1,099	0.2
WyA	Wyoming gravelly sandy loam, 0 to 3 percent slopes	514	1,534	2,048	0.4
WyB	Wyoming gravelly sandy loam, 3 to 8 percent slopes	1,988	3,478	5,466	1.0
WyC	Wyoming gravelly sandy loam, 8 to 15 percent slopes	792	2,325	3,117	0.6
WyD	Wyoming gravelly sandy loam, 15 to 25 percent slopes	795	1,731	2,525	0.4
WyE	Wyoming gravelly sandy loam, 25 to 45 percent slopes	332	1,237	1,569	0.3
	Water	1,288	983	2,271	0.4
	Total	290,560	253,440	544,000	100.0

* Less than 0.1 percent.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield figure indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Arnot:							
ArC	---	---	---	---	---	---	2.5
[2]AsB	---	---	---	---	---	---	---
[2]AsD	---	---	---	---	---	---	---
[2]ASE	---	---	---	---	---	---	---
Atherton:							
At	---	---	---	---	---	---	4.0
Bath:							
BaB	100	20	75	45	4.0	3.5	7.5
BaC	95	19	75	45	4.0	3.5	7.5
BaD	90	18	70	40	3.5	3.0	6.5
BbB, BbD	---	---	---	---	---	---	---
Braceville:							
BcB	105	21	80	---	4.5	3.5	8.5
Dumps:							
Da, Db.							
Dystrochrepts:							
[2]DYD	---	---	---	---	---	---	---
[2]DYE	---	---	---	---	---	---	---
Fluvents:							
[2]FA	---	---	---	---	---	---	---
Holly:							
Hm	90	18	65	---	---	3.0	6.0
Ho	---	---	---	---	---	---	4.0
Lackawanna:							
LaB	100	20	75	45	4.0	3.5	8.0
LaC	95	19	75	45	4.0	3.5	8.0
LaD	90	18	70	40	3.5	3.0	7.5
LbB, LbD	---	---	---	---	---	---	---
[2]LCE	---	---	---	---	---	---	---
Lordstown:							
LeB, LfB	85	17	70	40	3.5	3.0	6.5
LeC, LfC	85	17	70	40	3.5	3.0	6.5
LeD	80	16	65	35	3.0	3.0	5.5
LxB, LxD	---	---	---	---	---	---	---
Mardin:							
McB, MfB	90	18	70	40	4.0	3.0	7.5
McC, MfC	85	17	65	40	4.0	3.0	7.5

See footnotes at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Mardin:							
McD	80	16	65	35	3.5	3.0	6.5
MhB, MhD	---	---	---	---	---	---	---
Morris:							
MrA	80	16	65	35	3.0	3.0	6.0
MrB, MsB	80	16	65	35	3.0	3.0	6.0
MrC, MsC	70	14	60	30	3.0	3.0	6.0
MxB, MxD	---	---	---	---	---	---	---
Norwich:							
[2]NcA	---	15	60	---	---	---	4.5
[2]NcB	---	15	60	---	---	---	4.5
[2]NxB	---	---	---	---	---	---	---
Oquaga:							
OcB, OfB	85	17	75	45	3.5	3.0	6.5
OcC, OfC	85	17	70	40	3.5	3.0	6.5
OcD	80	16	65	35	3.0	3.0	5.5
OxB, OxD	---	---	---	---	---	---	---
[2]OYE	---	---	---	---	---	---	---
Philo:							
Ph	130	26	80	45	4.5	3.5	8.5
Pits:							
Pk.							
Pope:							
Po, Pp	130	26	80	45	4.5	3.5	8.5
Quarries:							
Qu.							
Rexford:							
ReA	80	16	65	35	3.0	3.0	5.5
Swartswood:							
SwB	100	20	80	45	4.0	3.5	8.5
SwC	90	18	75	40	4.0	3.5	8.5
SwD	80	16	65	35	3.5	3.0	8.0
SxB, SxD	---	---	---	---	---	---	---
Unadilla:							
UnB	105	21	75	45	4.5	3.5	8.5
UnC	100	20	75	45	4.5	3.5	8.5
Urban land:							
Ur, Us.							
Volusia:							
VcA	80	16	65	35	3.0	3.0	5.5
VcB, VfB	80	16	65	35	3.0	3.0	5.5

See footnotes at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Volusia:							
VcC, VfC	70	14	60	30	3.0	3.0	5.5
VxB, VxD	---	---	---	---	---	---	---
Wellsboro:							
WcB	90	18	70	40	4.0	3.0	7.5
WcC	85	17	65	40	4.0	3.0	7.5
WcD	80	16	65	35	3.5	3.0	6.5
WfB	80	16	65	35	3.5	2.5	6.5
WfC	75	15	60	35	3.5	2.5	6.5
WgB, WgD	---	---	---	---	---	---	---
Wurtsboro:							
WkB	90	18	70	40	4.0	3.0	8.0
WkC	85	17	65	40	4.0	3.0	8.0
WxB, WxD	---	---	---	---	---	---	---
Wyoming:							
WyA, WyB	90	18	75	45	4.0	3.0	7.5
WyC	75	15	70	40	3.5	2.5	6.5
WyD	---	---	50	30	3.0	2.0	5.5
WyE	---	---	---	---	---	---	---

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the whole map unit.

TABLE 5.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	5,146	---	---	---
II	31,241	8,727	21,350	1,164
III	99,992	52,053	34,289	13,650
IV	70,355	35,811	8,362	26,182
V	2,682	---	2,682	---
VI	4,382	---	---	4,382
VII	264,314	1,569	---	262,745
VIII	---	---	---	---

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Arnot:								
ArC	4d	Slight	Slight	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash	55 50 55 55	Eastern white pine, red pine, sugar maple, European larch.
[1]AsB:								
Arnot part	4d	Slight	Moderate	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash	55 50 55 55	Eastern white pine, red pine, sugar maple, European larch.
Rock outcrop part.								
[1]AsD:								
Arnot part	4d	Slight	Moderate	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash	55 50 55 55	Eastern white pine, red pine, sugar maple, European larch.
Rock outcrop part.								
[1]ASE:								
Arnot part	4d	Moderate	Severe	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash	55 50 55 55	Eastern white pine, red pine, sugar maple, European larch.
Rock outcrop part.								
Atherton:								
At	5w	Slight	Severe	Severe	Severe	Eastern white pine	62	Northern white-cedar.
Bath:								
BaB, BaC	3o	Slight	Slight	Slight	Slight	Northern red oak Black cherry Sugar maple	61 75 70	Eastern white pine, red pine, Norway spruce, European larch.
BaD	3r	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple	61 75 70	Eastern white pine, red pine, Norway spruce, European larch.
BbB, BbD	3x	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple	61 75 70	Eastern white pine, red pine, Norway spruce, European larch.
Braceville:								
BcB	2o	Slight	Slight	Slight	Slight	Northern red oak White ash Sugar maple Black cherry Yellow-poplar	80 80 80 80 90	Yellow-poplar, European larch, Norway spruce, eastern white pine, black cherry.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Holly:								
Hm, Ho	5w	Slight	Severe	Severe	Moderate	Pin oak	90	
						Swamp white oak	50	
						Red maple	50	
						White ash	50	
Lackawanna:								
LaB, LaC	3o	Slight	Slight	Slight	Slight	Northern red oak	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
						White ash	70	
LaD	3r	Slight	Moderate	Slight	Slight	Northern red oak	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
						White ash	70	
LbB, LbD	3x	Slight	Moderate	Slight	Slight	Northern red oak	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
						White ash	70	
[1]LCE:								
Lackawanna part	3x	Moderate	Severe	Slight	Slight	Northern red oak	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
						White ash	70	
Bath part	3x	Moderate	Severe	Slight	Slight	Northern red oak	61	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
Lordstown:								
LeB, LeC, LfB, LfC	3f	Slight	Slight	Moderate	Slight	Northern red oak	60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
						Sugar maple	73	
						White ash	75	
LeD	3r	Slight	Moderate	Moderate	Slight	Northern red oak	60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
						Sugar maple	73	
						White ash	75	
LxB, LxD	3x	Slight	Moderate	Moderate	Slight	Sugar maple	73	Eastern white pine, red pine, European larch, Norway spruce.
						Northern red oak	60	
						White ash	75	
Mardin:								
McB, McC, MfB, MfC	3o	Slight	Slight	Slight	Slight	Sugar maple	60	Red pine, European larch, Norway spruce, eastern white pine.
						Northern red oak	63	
						Black cherry	75	
McD	3r	Slight	Moderate	Slight	Slight	Sugar maple	60	Red pine, European larch, Norway spruce, eastern white pine.
						Northern red oak	63	
						Black cherry	75	
MhB, MhD	3x	Slight	Moderate	Slight	Slight	Sugar maple	60	Red pine, European larch, Norway spruce, eastern white pine.
						Northern red oak	63	
						Black cherry	75	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Morris: MrA, MrB, MrC, MsB, MsC	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry White ash	65 79 69 71	Eastern white pine, Norway spruce, white spruce, European larch.
MxB, MxD	3x	Slight	Moderate	Moderate	Moderate	White ash	71	European larch.
Norwich: [1]NcA: Norwich part	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Chippewa part	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
[1]NcB: Norwich part	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Chippewa part	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
[1]NxB: Norwich part	5x	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Chippewa part	5x	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Oquaga: OcB, OcC, OfB, OfC	3f	Slight	Slight	Moderate	Slight	Sugar maple Northern red oak Black cherry Eastern white pine	69 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
OcD	3r	Slight	Moderate	Moderate	Slight	Sugar maple Northern red oak Black cherry Eastern white pine	69 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
OxB, OxD	3x	Slight	Moderate	Moderate	Slight	Sugar maple Northern red oak White ash	73 60 75	Eastern white pine, red pine, European larch, Norway spruce.
[1]OYE: Oquaga part	3x	Moderate	Severe	Moderate	Slight	Sugar maple Northern red oak White ash	73 60 75	Eastern white pine, red pine, European larch, Norway spruce.
Lordstown part	3x	Moderate	Severe	Moderate	Slight	Sugar maple Northern red oak White ash	73 60 75	Eastern white pine, red pine, European larch, Norway spruce.
Philo: Ph	2w	Slight	Slight	Slight	Slight	Virginia pine Northern red oak Yellow-poplar Sweetgum	74 79 102 90	Eastern white pine, yellow-poplar.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Pope:								
Po, Pp	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine	80 102 89 74	Eastern white pine, yellow-poplar, black walnut, black cherry, Norway spruce, European larch.
Rexford:								
ReA	3w	Slight	Moderate	Moderate	Moderate	Northern red oak White ash Sugar maple Black cherry	70 70 70 70	Black cherry, European larch, Norway spruce, white spruce, eastern white pine.
Swartswood:								
SwB, SwC	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
SwD	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
SxB, SxD	3x	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
Unadilla:								
UnB	3o	Slight	Slight	Slight	Slight	Sugar maple Eastern white pine Northern red oak Black cherry White ash	65 75 70 70 70	Eastern white pine, Norway spruce, black cherry, European larch, red pine, white spruce.
UnC	3r	Moderate	Slight	Slight	Slight	Sugar maple Eastern white pine Northern red oak Black cherry White ash	65 75 70 70 70	Eastern white pine, Norway spruce, black cherry, European larch, red pine, white spruce.
Volusia:								
VcA, VcB, VcC, VfC, VfB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple White ash	62 64 75	Eastern white pine, Norway spruce, European larch, white spruce, black cherry.
VxB, VxD	3x	Moderate	Moderate	Moderate	Moderate	Northern red oak Sugar maple White ash	62 64 75	Eastern white pine, Norway spruce, European larch, white spruce, black cherry.
Wellsboro:								
WcB, WcC, WfB, WfC	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	78 70	Norway spruce, eastern white pine, red pine, black cherry, European larch.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Wellsboro:								
WcD	2r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	78 70	Norway spruce, eastern white pine, red pine, black cherry, European larch.
WgB, WgD	2x	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	78 70	European larch.
Wurtsboro:								
WkB, WkC	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	70 70	Norway spruce, eastern white pine, red pine, black cherry, European larch.
WxB, WxD	3x	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	70 70	European larch.
Wyoming:								
WyA, WyB, WyC	4f	Slight	Slight	Severe	Slight	Northern red oak	55	Eastern white pine, red pine, Virginia pine.
WyD	4f	Slight	Moderate	Severe	Slight	Northern red oak	55	Eastern white pine, red pine, Virginia pine.
WyE	4f	Moderate	Severe	Severe	Slight	Northern red oak	55	Eastern white pine, red pine, Virginia pine.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Arnot:						
ArC	Severe: depth to rock, small stones, rock outcrops.	Severe: depth to rock, rock outcrops.	Severe: depth to rock, rock outcrops.	Severe: slope, depth to rock, rock outcrops.	Severe: depth to rock, rock outcrops.	Severe: depth to rock, rock outcrops, small stones.
[1]AsB:						
Arnot part	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, small stones.
Rock outcrop part.						
[1]AsD:						
Arnot part	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.
Rock outcrop part.						
[1]ASE:						
Arnot part	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.
Rock outcrop part.						
Atherton:						
At	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness. frost action.	Severe: wetness.
Bath:						
BaB	Moderate: wetness, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Slight.
BaC	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
BaD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BbB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: large stones, frost action.	Severe: large stones.
BbD	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Braceville:						
BcB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: wetness, slope, frost action.	Moderate: frost action, low strength.	Slight.
Dumps:						
Da, Db.						

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Dystrochrepts:						
[1]DYD: Dystrochrepts part.						
[1]DYE: Dystrochrepts part.						
Fluvents:						
[1]FA: Fluvents part.						
Fluvaquents part.						
Haplaquents, stony HA.						
Holly:						
Hm, Ho	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: floods, wetness, frost action.	Severe: wetness, floods.
Lackawanna:						
LaB	Moderate: wetness, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Slight.
LaC	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope, frost action.	Moderate: slope, frost action.	Moderate: slope.
LaD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LbB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.	Severe: large stones.
LbD	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
[1]LCE:						
Lackawanna part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Bath part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Lordstown:						
LeB	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
LeC	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Moderate: slope, depth to rock.
LeD	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Lordstown:						
LfB	Severe: depth to rock.	Moderate: depth to rock. frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.	Severe: small stones.
LfC	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: small stones.
LxB	Severe: large stones, depth to rock.	Severe: large stones.	Severe: large stones, depth to rock.	Severe: large stones.	Moderate: large stones, depth to rock, frost action.	Severe: large stones.
LxD	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Mardin:						
McB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action, low strength.	Slight.
McC	Severe: wetness.	Moderate: frost action.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope, low strength.	Moderate: slope.
McD	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MfB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action, low strength.	Severe: small stones.
MfC	Severe: wetness.	Moderate: slope, frost action.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope, low strength.	Severe: small stones.
MhB	Severe: large stones, wetness.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, low strength, large stones.	Severe: large stones.
MhD	Severe: slope, large stones, wetness.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Medisaprists and Medihemists:						
MK.						
Morris:						
MrA, MrB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Moderate: wetness.
MrC	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope, frost action.	Severe: frost action.	Moderate: wetness, slope.
MsB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Severe: small stones.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Morris:						
MsC	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope, frost action.	Severe: frost action.	Severe: small stones.
MxB	Severe: wetness, large stones.	Severe: frost action, large stones.	Severe: wetness, large stones.	Severe: slope, frost action, large stones.	Severe: frost action.	Severe: large stones.
MxD	Severe: slope, wetness, large stones.	Severe: slope, frost action, large stones.	Severe: slope, wetness, large stones.	Severe: slope, frost action, large stones.	Severe: slope, frost action.	Severe: slope, large stones.
Norwich:						
[1]NcA:						
Norwich part	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
Chippewa part	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
[1]NcB:						
Norwich part	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
Chippewa part	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
[1]NxB:						
Norwich part	Severe: wetness, large stones.	Severe: wetness, large stones, frost action.	Severe: wetness, large stones.	Severe: wetness, frost action, large stones.	Severe: wetness, frost action.	Severe: wetness, large stones.
Chippewa part	Severe: wetness, large stones.	Severe: wetness, large stones, frost action.	Severe: wetness, large stones.	Severe: wetness, large stones, frost action.	Severe: wetness, frost action.	Severe: wetness, large stones.
Oquaga:						
OcB	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
OcC	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Moderate: slope, depth to rock.
OcD	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
OfB	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.	Severe: small stones.
OfC	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: small stones.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Oquaga:						
OxB	Severe: large stones, depth to rock.	Severe: large stones.	Severe: large stones, depth to rock.	Severe: large stones.	Moderate: large stones, depth to rock, frost action.	Severe: large stones.
OxD	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
[1]OYE:						
Oquaga part	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Lordstown part	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Philo:						
Ph	Severe: floods, wetness.	Severe: floods, frost action.	Severe: floods.	Severe: floods, frost action.	Severe: frost action.	Moderate: floods.
Pits:						
Pk.						
Pope:						
Po	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action.	Moderate: floods.
Pp	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: frost action.	Slight.
Quarries:						
Qu.						
Rexford:						
ReA	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Moderate: wetness.
Swartswood:						
SwB	Moderate: wetness.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Slight.
SwC	Moderate: slope, wetness.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
SwD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SxB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: large stones, frost action.	Severe: large stones.
SxD	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Udorthents, strip mine; UA.						

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Unadilla:						
UnB	Slight	Severe: frost action.	Slight	Severe: frost action.	Severe: frost action.	Slight.
UnC	Moderate: slope.	Severe: frost action.	Moderate: slope.	Severe: slope, frost action.	Severe: frost action.	Moderate: slope.
Urban land: Ur, Us.						
Volusia:						
VcA, VcB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Moderate: wetness.
VcC	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope, frost action.	Severe: frost action.	Moderate: slope, wetness.
VfB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Severe: small stones.
VfC	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope, frost action.	Severe: frost action.	Severe: small stones.
VxB	Severe: wetness, large stones.	Severe: large stones, frost action.	Severe: wetness, large stones.	Severe: large stones, frost action.	Severe: frost action.	Severe: large stones.
VxD	Severe: slope, wetness, large stones.	Severe: slope, large stones, frost action.	Severe: slope, wetness, large stones.	Severe: slope, large stones, frost action.	Severe: slope, frost action.	Severe: slope, large stones.
Wellsboro:						
WcB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.	Slight.
WcC	Severe: wetness.	Moderate: slope, frost action.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: slope.
WcD	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WfB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.	Severe: small stones.
WfC	Severe: wetness.	Moderate: slope, frost action.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
WgB	Severe: wetness, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.	Severe: large stones.
WgD	Severe: slope, wetness, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope,

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Wurtsboro:						
WkB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate:	Slight.
WkC	Severe: wetness.	Moderate: frost action.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: slope.
WxB	Severe: wetness, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.	Severe: large stones.
WxD	Severe: slope, wetness, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Wyoming:						
WyA	Severe: small stones.	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.	Moderate: too sandy.
WyB	Severe: small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Moderate: too sandy.
WyC	Severe: small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: too sandy, slope.
WyD, WyE	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Arnot:					
ArC	Severe*: depth to rock, rock outcrop.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Moderate: slope.	Poor: small stones, thin layer.
AsB**:					
Arnot part	Severe*: depth to rock.	Severe: depth to rock, small stones.	Severe: depth to rock.	Slight	Poor: small stones, thin layer.
Rock outcrop part.					
AsD**:					
Arnot part	Severe*: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Rock outcrop part.					
ASE**:					
Arnot part	Severe*: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Rock outcrop part.					
Atherton:					
At	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bath:					
BaB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
BaC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, small stones.
BaD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
BbB	Severe: large stones, percs slowly, wetness.	Moderate: slope, large stones.	Severe: large stones, wetness.	Moderate: wetness.	Poor: large stones.
BbD	Severe: slope, large stones, percs slowly.	Severe: slope, large stones.	Severe: large stones, wetness.	Severe: slope.	Poor: slope, large stones.
Braceville:					
BcB	Severe: percs slowly, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: small stones.
Dumps:					
Da, Db.					

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Dystrochrepts:					
DYD**:					
Dystrochrepts part.					
DYE**:					
Dystrochrepts part.					
Fluvents:					
FA**:					
Fluvents part.					
Fluvaquents part.					
Haplaquents, stony: HA.					
Holly:					
Hm, Ho	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods, wetness, seepage.	Severe: floods, wetness.	Poor: wetness.
Lackawanna:					
LaB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
LaC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, small stones.
LaD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
LbB	Severe: percs slowly, large stones, wetness.	Severe: large stones.	Severe: wetness, large stones.	Moderate: wetness.	Poor: large stones.
LbD	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope.	Poor: slope, large stones.
LCE**:					
Lackawanna part	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: slope, wetness, large stones.	Severe: slope.	Poor: slope, large stones.
Bath part	Severe: slope, large stones, percs slowly.	Severe: slope, large stones.	Severe: slope, large stones, wetness.	Severe: slope.	Poor: slope, large stones.
Lordstown:					
LeB, LfB	Severe*: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: small stones, thin layer.
LeC, LfC	Severe*: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: small stones, thin layer, slope.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lordstown:					
LeD	Severe*: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
LxB	Severe*: large stones, depth to rock.	Severe: depth to rock, large stones.	Severe: large stones, depth to rock.	Slight	Poor: large stones.
LxD	Severe*: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: large stones, depth to rock.	Severe: slope.	Poor: slope, large stones.
Mardin:					
McB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.
McC, MfC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, slope.
McD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope, wetness.	Poor: slope.
MfB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.
MhB	Severe: large stones, wetness, percs slowly.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
MhD	Severe: slope, large stones, wetness.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Medisaprists and Medihemists: MK.					
Morris:					
MrA	Severe: percs slowly, wetness.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
MrB, MsB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
MrC, MsC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: slope, small stones.
MxB	Severe: percs slowly, wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
MxD	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Norwich:					
NcA**:					
Norwich part	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Chippewa part	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
NcB**:					
Norwich part	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Chippewa part	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
NxB**:					
Norwich part	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: wetness, large stones.
Chippewa part	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: wetness, large stones.
Oquaga:					
OcB, OfB	Severe*: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: small stones.
OcC, OfC	Severe*: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: small stones.
OcD	Severe*: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, small stones.
OxB	Severe*: large stones, depth to rock.	Severe: depth to rock, large stones.	Severe: large stones, depth to rock.	Slight	Poor: large stones.
OxD	Severe*: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: large stones, depth to rock.	Severe: slope.	Poor: slope, large stones.
OYE**:					
Oquaga part	Severe*: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope.	Poor: slope.
Lordstown part	Severe*: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope.	Poor: slope, large stones.
Philo:					
Ph	Severe: floods, wetness.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, wetness.	Good.
Pits:					
Pk.					

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pope:					
Po	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Pp	Moderate: floods.	Severe: floods, seepage.	Severe: seepage.	Severe: seepage.	Good.
Quarries:					
Qu.					
Rexford:					
ReA	Severe: percs slowly, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: thin layer, small stones.
Swartswood:					
SwB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
SwC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
SwD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
SxB	Severe: percs slowly, wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Moderate: wetness.	Poor: large stones.
SxD	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope.	Poor: slope, large stones.
Udorthents, strip mine:					
UA.					
Unadilla:					
UnB	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
UnC	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
Urban land:					
Ur, Us.					
Volusia:					
VcA	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
VcB, VfB	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
VcC, VfC	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: slope, small stones.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Volusia:					
VxB	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
VxD	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Wellsboro:					
WcB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
WcC, WfC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, slope.
WcD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: slope, wetness.	Poor: slope.
WfB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
WgB	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
WgD	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Wurtsboro:					
WkB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.
WkC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, slope.
WxB	Severe: percs slowly, wetness, large stones.	Severe: slope.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
WxD	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Wyoming:					
WyA, WyB	Slight*	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WyC	Moderate*: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WyD	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, small stones.
WyE	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.

*Hazard of ground water contamination.
**This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 9.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Arnot:				
ArC	Poor: thin layer, rock outcrops.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones.
[1]AsB:				
Arnot part	Poor: thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones.
Rock outcrop part.				
[1]AsD:				
Arnot part	Poor: thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, small stones.
Rock outcrop part.				
[1]ASE:				
Arnot part	Poor: slope, thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, small stones.
Rock outcrop part.				
Atherton:				
At	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Bath:				
BaB, BaC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
BaD	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
BbB	Fair: large stones.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones, small stones.
BbD	Fair: slope, large stones.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Braceville:				
BcB	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
Dumps:				
Da, Db.				
Dystrochrepts:				
[1]DYD:				
Dystrochrepts part.				
[1]DYE:				
Dystrochrepts part.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Fluvents:				
[1]FA:				
Fluvents part.				
Fluvaquents part.				
Haplaquents, stony:				
HA.				
Holly:				
Hm, Ho	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Lackawanna:				
LaB, LaC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
LaD	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
LbB	Fair: frost action, large stones.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones, small stones.
LbD	Fair: frost action, large stones, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
[1]LCE:				
Lackawanna part	Poor: slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Bath part	Poor: slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Lordstown:				
LeB, LeC, LfB, LfC	Poor: thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones.
LeD	Poor: thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, small stones.
LxB	Poor: thin layer.	Unsuited: large stones.	Unsuited: large stones.	Poor: large stones, small stones.
LxD	Poor: thin layer.	Unsuited: large stones.	Unsuited: large stones.	Poor: slope, large stones, small stones.
Mardin:				
McB, McC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
McD	Fair: frost action, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Mardin:				
MfB, MfC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
MhB	Fair: frost action, large stones.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones, small stones.
MhD	Fair: frost action, large stones, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Medisaprists and Medihemists:				
MK.				
Morris:				
MrA, MrB, MrC, MsB, MsC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Morris:				
MxB	Poor: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones,
MxD	Poor: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Norwich:				
[1]NcA:				
Norwich part	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, small stones.
Chippewa part	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, small stones.
[1]NcB:				
Norwich part	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, small stones.
Chippewa part	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, small stones.
[1]NxB:				
Norwich part	Poor: wetness, frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: wetness, large stones, small stones.
Chippewa part	Poor: wetness, frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: wetness, large stones, small stones.
Oquaga:				
OcB, OcC, OfB, OfC	Poor: thin layer.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones.
OcD	Poor: thin layer.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Oquaga:				
OxB	Poor: thin layer.	Unsuited: excess fines, thin layer, large stones.	Unsuited: large stones.	Poor: large stones, small stones.
OxD	Poor: thin layer. large stones.	Unsuited: excess fines, thin layer, large stones.	Unsuited: large stones.	Poor: slope, large stones, small stones.
[1]OYE:				
Oquaga part	Poor: slope, thin layer.	Unsuited: excess fines, thin layer, large stones.	Unsuited: large stones.	Poor: slope, large stones, small stones.
Lordstown part	Poor: slope, thin layer.	Unsuited: excess fines, thin layer, large stones.	Unsuited: large stones.	Poor: slope, large stones, small stones.
Philo:				
Ph	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
Pits:				
Pk.				
Pope:				
Po, Pp	Fair: low strength, frost action	Poor: excess fines.	Unsuited: excess fines.	Good.
Quarries:				
Qu.				
Rexford:				
ReA	Poor: frost action.	Poor: excess fines.	Poor: excess fines.	Fair: thin layer.
Swartswood:				
SwB, SwC	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
SwD	Fair: slope, frost action.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
SxB	Fair: frost action, large stones.	Unsuited: large stones.	Unsuited: large stones.	Poor: large stones, small stones.
SxD	Fair: large stones, slope, frost action.	Unsuited: large stones.	Unsuited: large stones.	Poor: slope, large stones, small stones.
Udorthents, strip mine:				
UA.				
Unadilla:				
UnB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
UnC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
Urban land:				
Ur, Us.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Volusia: VcA, VcB, VcC, VfB, VfC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
VxB	Poor: frost action	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones, small stones.
VxD	Poor: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Wellsboro: WcB, WcC, WfB, WfC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
WcD	Fair: frost action, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
WgB	Fair: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones, small stones.
WgD	Fair: frost action, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, small stones.
Wurtsboro: WkB, WkC	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
WxB	Fair: frost action, large stones.	Unsuited: large stones.	Unsuited: large stones.	Poor: large stones, small stones.
WxD	Fair: frost action.	Unsuited: large stones.	Unsuited: large stones.	Poor: slope, large stones, small stones.
Wyoming: WyA, WyB, WyC	Fair: frost action.	Good	Good	Poor: small stones.
WyD	Fair: slope, frost action.	Good	Good	Poor: slope, small stones.
WyE	Poor: slope.	Good	Good	Poor: slope, small stones.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 10.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Arnot:						
ArC	Depth to rock, slope, seepage.	Thin layer, slope, seepage.	Depth to rock, slope, no water.	Not needed	Depth to rock, slope, rock outcrops.	Droughty, rooting depth, slope.
[1]AsB:						
Arnot part	Depth to rock, slope, seepage.	Thin layer, slope, seepage.	Depth to rock, slope, no water.	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
Rock outcrop part.						
[1]AsD:						
Arnot part	Depth to rock, slope, seepage.	Thin layer, slope, seepage.	Depth to rock, slope, no water.	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
Rock outcrop part.						
[1]ASE:						
Arnot part	Depth to rock, slope, seepage.	Thin layer, slope, seepage.	Depth to rock, slope, no water.	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
Rock outcrop part.						
Atherton:						
At	Seepage	Piping, seepage.	Favorable	Wetness, poor outlets.	Wetness	Wetness.
Bath:						
BaB, BaC, BaD	Favorable, slope.	Favorable	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, slope, erodes easily.
BbB, BbD	Slope	Large stones	Large stones, no water.	Not needed	Large stones, slope, percs slowly.	Large stones, slope.
Braceville:						
BcB	Seepage	Low strength, piping.	Slow refill	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Dumps:						
Da, Db.						
Dystrochrepts:						
[1]DYD:						
Dystrochrepts part.						
[1]DYE:						
Dystrochrepts part.						
Fluvents:						
[1]FA:						
Fluvents part.						
Fluvaquents part.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Haplaquents: HA.						
Holly: Hm, Ho	Seepage	Piping, floods.	Favorable	Floods, wetness, poor outlets.	Not needed	Wetness.
Lackawanna: LaB, LaC, LaD	Slope	Piping	No water	Not needed	Percs slowly, erodes easily, slope.	Percs slowly, erodes easily, slope.
LbB, LbD	Slope	Large stones, piping.	No water, large stones.	Not needed	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.
[1]LCE: Lackawanna part	Slope	Large stones, piping.	No water, large stones.	Not needed	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.
Bath part	Slope	Large stones	Large stones, no water.	Not needed	Large stones, slope, percs slowly.	Large stones, slope, percs slowly.
Lordstown: LeB, LeC, LeD, LfB, LfC	Depth to rock, slope, seepage.	Piping, low strength, seepage.	No water, depth to rock.	Not needed	Depth to rock, rooting depth, slope.	Droughty, slope, rooting depth.
LxB, LxD	Slope, depth to rock.	Depth to rock, large stones, seepage.	Depth to rock, large stones, no water.	Not needed	Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
Mardin: McB, McC, McD, MfB, MfC	Slope	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
MhB, MhD	Slope	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Medisaprists: MK.						
Morris: MrA, MrB, MrC, MsB, MsC	Favorable, slope.	Favorable	Favorable	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
MxB, MxD	Slope	Large stones	Large stones	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.
Norwich: [1]NcA: Norwich part	Favorable	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Chippewa part	Slope	Favorable	Slow refill	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
[1]NcB: Norwich part	Favorable	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Norwich:						
Chippewa part--	Slope	Favorable	Slow refill	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
[1]NxB:						
Norwich part---	Favorable	Large stones	Large stones	Wetness, percs slowly, large stones.	Large stones, wetness, percs slowly.	Large stones, wetness, percs slowly.
Chippewa part--	Slope	Large stones	Large stones, slow refill.	Wetness, percs slowly, large stones.	Large stones, wetness, percs slowly.	Large stones, wetness, percs slowly.
Oquaga:						
OcB, OcC, OcD, OfB, OfC	Depth to rock slope, seepage.	Piping, thin layer, seepage.	No water, depth to rock.	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
OxB, OxD	Slope, depth to rock, seepage.	Depth to rock, large stones, seepage.	Depth to rock, large stones, no water.	Not needed	Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
[1]OYE:						
Oquaga part----	Slope, depth to rock, seepage.	Depth to rock, large stones, seepage.	Depth to rock, large stones, no water.	Not needed	Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
Lordstown part-	Slope, depth to rock, seepage.	Depth to rock, large stones, seepage.	Depth to rock, large stones, no water.	Not needed	Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
Philo:						
Ph	Seepage	Piping	Deep to water	Floods, poor outlets.	Not needed	Not needed.
Pits:						
Pk.						
Pope:						
Po, Pp	Seepage	Piping	No water	Not needed	Not needed	Not needed.
Quarries:						
Qu.						
Rexford:						
ReA	Seepage	Piping, low strength.	Slow refill	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Swartswood:						
SwB, SwC, SwD	Slope	Favorable	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, erodes easily, slope.
SxB, SxD	Slope	Large stones	No water	Not needed	Large stones, percs slowly.	Large stones, percs slowly, slope.
Udorthents:						
UA.						
Unadilla:						
UnB, UnC	Seepage	Low strength, piping, seepage.	No water	Not needed	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Urban land: Ur, Us.						
Volusia: VcA, VcB, VcC, VfB, VfC	Slope	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
VxB, VxD	Slope	Large stones	Large stones	Wetness, percs slowly.	Wetness, large stones, percs slowly.	Wetness, large stones, percs slowly.
Wellsboro: WcB, WcC, WcD, WfB, WfC	Slope	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
Wellsboro: WgB, WgD	Slope, large stones.	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Wurtsboro: WkB, WkC	Slope	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
WxB, WxD	Slope, large stones.	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Wyoming: WyA, WyB, WyC, WyD, WyE	Seepage	Seepage, piping.	No water	Not needed	Complex slope, piping.	Droughty, slope.

[1]This map unit is made up of two or more dominant kinds of soil. See descriptions of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 11.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Arnot:					
ArC	Severe: small stones.	Severe: small stones.	Severe: slope, depth to rock, small stones.	Severe: small stones.	Severe: depth to rock, small stones.
[1]AsB:					
Arnot part	Severe: small stones.	Severe: small stones.	Severe: depth to rock, small stones.	Severe: small stones.	Severe: depth to rock, small stones.
Rock outcrop part.					
[1]AsD:					
Arnot part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, depth to rock, small stones.	Severe: small stones.	Severe: slope, depth to rock, small stones.
Rock outcrop part.					
[1]ASE:					
Arnot part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, small stones.	Severe: slope, depth to rock, small stones.
Rock outcrop part.					
Atherton:					
At	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Bath:					
BaB	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
BaC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
BaD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
BbB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
BbD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
Braceville:					
BcB	Moderate: wetness, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Dumps: Da, Db.					
Dystrochrepts: [1]DYD: Dystrochrepts part.					
[1]DYE: Dystrochrepts part.					
Fluvents: [1]FA: Fluvents part.					
Fluvaquents part.					
Haplaquents: Ha.					
Holly: Hm, Ho	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Lackawanna: LaB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
LaC	Moderate: slope.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
LaD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
LbB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
LbD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
[1]LCE: Lackawanna part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope, large stones, small stones.
Bath part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope, large stones, small stones.
Lordstown: LeB, LfB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
LeC, LfC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Lordstown:					
LeD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
LxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
LxD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
Mardin:					
McB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
McC	Moderate: slope, percs slowly.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
McD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.	Severe: slope, small stones.
MfB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
MfC	Moderate: slope, percs slowly.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
MhB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
MhD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
Medisaprists and Medihemists:					
MK.					
Morris:					
MrA	Moderate: wetness,, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.
MrB, MsB	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.
MrC, MsC	Moderate: slope, wetness.	Moderate: slope, wetness, small stones.	Severe: slope, small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.
MxB	Severe: large stones.	Moderate: large stones, wetness, small stones.	Severe: large stones, small stones, wetness.	Severe: large stones.	Severe: large stones, small stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Morris:					
MxD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, wetness.	Severe: large stones.	Severe: slope, large stones, small stones.
Norwich:					
[1]NcA:					
Norwich part	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: wetness, small stones.
Chippewa part	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: wetness, small stones.
[1]NcB:					
Norwich part	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: wetness, small stones.
Chippewa part	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: wetness, small stones.
[1]NxB:					
Norwich part	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness, small stones, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones, small stones.
Chippewa part	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness, large stones, small stones.	Severe: wetness, large stones.	Severe: wetness, large stones, small stones.
Oquaga:					
OcB, OfB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
OcC, OfC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
OcD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
OxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
OxD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
[1]OYE:					
Oquaga part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope, large stones, small stones.
Lordstown part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope, large stones, small stones.
Philo:					
Ph	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight	Moderate: floods.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pits: Pk.					
Pope: Po	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight	Moderate: floods.
Pp	Slight	Slight	Slight	Slight	Slight.
Quarries: Qu.					
Rexford: ReA	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Swartswood: SwB	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
SwC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
SwD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
SxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
SxD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
Udorthents, strip mine: UA.					
Unadilla: UnB	Slight	Slight	Moderate: slope.	Slight	Slight.
UnC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land: Ur, Us.					
Volusia: VcA, VcB, VfB	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.
VcC, VfC	Moderate: slope, wetness.	Moderate: slope, wetness, small stones.	Severe: slope, small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.
VxB	Severe: large stones.	Moderate: wetness, large stones, small stones.	Severe: large stones, wetness, small stones.	Severe: large stones.	Severe: large stones, small stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Volusia:					
VxD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, wetness.	Severe: large stones.	Severe: slope, large stones, small stones.
Wellsboro:					
WcB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
WcC	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
WcD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
WfB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
WfC	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
WgB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.
WgD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
Wurtsboro:					
WkB	Moderate: percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
WkC	Moderate: percs slowly, slope.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
WxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: large stones, small stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Wurtsboro:					
WxD	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.	Severe: slope, large stones, small stones.
Wyoming:					
WyA, WyB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
WyC	Moderate: slope, small stones.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.	Moderate: small stones, slope.
WyD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.	Severe: slope.
WyE	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Arnot:										
ArC	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor.
[1]AsB:										
Arnot part	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor.
Rock outcrop part.										
[1]AsD:										
Arnot part	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Rock outcrop part.										
[1]ASE:										
Arnot part	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Rock outcrop part.										
Atherton:										
At	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Bath:										
BaB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
BaC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
BaD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
BbB	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor.
BbD	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor.
Braceville:										
BcB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Dumps:										
Da, Db.										
Dystrochrepts:										
[1]DYD:										
Dystrochrepts part.										
[1]DYE:										
Dystrochrepts part.										

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Fluvents:										
[1]FA:										
Fluvents part.										
Fluvaquents part.										
Haplaquents:										
HA.										
Holly:										
Hm	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ho	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Lackawanna:										
LaB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
LaC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
LaD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
LbB	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor.
LbD	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor.
[1]LCE:										
Lackawanna part	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor.
Bath part	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor.
Lordstown:										
LeB, LfB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
LeC, LfC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
LeD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
LxB	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor.
LxD	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor.
Mardin:										
McB, MfB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
McC, MfC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
McD	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
MhB	Very poor	Very poor	Good	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Mardin:										
MhD	Very poor.	Very poor.	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
Medisaprist and Medihemists MK.										
Morris:										
MrA	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
MrB, MsB	Poor	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor.
MrC, MsC	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
MxB	Very poor	Very poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor.
MxD	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
Norwich:										
[1]NcA:										
Norwich part	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Chippewa part	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
[1]NcB:										
Norwich part	Very poor	Poor	Poor	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor.
Chippewa part	Very poor	Poor	Poor	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor.
[1]NxB:										
Norwich part	Very poor	Very poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Poor	Very poor.
Chippewa part	Very poor	Very poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Poor	Very poor.
Oquaga:										
OcB, OfB	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor.
OcC, OfC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
OcD	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
OxB	Very poor	Very poor	Good	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor.
OxD	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
[1]OYE:										
Oquaga part	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
Lordstown part	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Philo:										
Ph	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Pits:										
Pk.										
Pope:										
Po, Pp	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Quarries:										
Qu.										
Rexford:										
ReA	Fair	Fair	Good	Fair	Fair	Fair	Poor	Fair	Fair	Poor.
Swartswood:										
SwB	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
SwC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
SwD	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
SxB	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor.
SxD	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor.
Udorthents, strip mine:										
UA.										
Unadilla:										
UnB	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
UnC	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
Urban land:										
Ur, Us.										
Volusia:										
VcA	Poor	Poor	Fair	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
VcB, VfB	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor.
VcC, VfC	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor.
VxB	Very poor	Very poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor.
VxD	Very poor	Very poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Wellsboro:										
WcB, WfB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
WcC, WfC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Wellsboro:										
WcD	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
WgB	Very poor	Very poor	Good	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor.
WgD	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
Wurtsboro:										
WkB	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
WkC	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
WxB	Very poor	Very poor	Good	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor.
WxD	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
Wyoming:										
WyA, WyB, WyC	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
WyD	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
WyE	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Arnot:											
ArC----------	0-9	Very channery silt loam.	ML, GM,SM	A-2, A-4	10-25	50-65	40-60	35-55	30-55	10-30	2-4
	9-19	Very channery silt loam. Very channery loam, channery loam.	ML, GM,SM	A-2, A-4	10-25	50-65	25-60	25-55	30-55	10-30	2-4
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]AsB:											
Arnot part------	0-9	Very channery silt loam.	ML, GM,SM	A-2, A-4	10-25	50-65	40-60	35-55	30-55	10-30	2-4
	9-19	Very channery silt loam. Very channery loam, channery loam.	ML, GM,SM	A-2, A-4	10-25	50-65	25-60	25-55	30-55	10-30	2-4
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]AsD:											
Arnot part------	0-9	Very channery silt loam.	ML, GM,SM	A-2, A-4	10-25	50-65	40-60	35-55	30-55	10-30	2-4
	9-19	Very channery silt loam. Very channery loam, channery loam.	ML, GM,SM	A-2, A-4	10-25	50-65	25-60	25-55	30-55	10-30	2-4
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]ASE:											
Arnot part------	0-9	Very channery silt loam.	ML, GM,SM	A-2, A-4	10-25	50-65	40-60	35-55	30-55	10-30	2-4
	9-19	Very channery silt loam. Very channery loam, channery loam.	ML, GM,SM	A-2, A-4	10-25	50-65	25-60	25-55	30-55	10-30	2-4
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Atherton:											
At----------	0-9	Loam----------	ML, CL,ML-CL	A-4, A-7, A-5, A-6	0-5	95-100	90-100	75-95	55-85	25-50	5-20
	9-36	Gravelly loam, sandy clay loam gravelly sandy loam.	GM-GC, CL,ML,SC	A-4, A-6	0-5	65-95	60-95	50-90	40-80	25-40	5-20
	36-60	Stratified gravelly loam to silty clay.	GM,SM-SC	A-1, A-2, A-4	0-5	50-80	45-75	25-70	20-60	5-15	NP-5
			CL-ML, ML								

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Bath:											
BaB, BaC, BaD-----	0-10	Channery silt loam.	ML, SM,GM	A-2, A-4	5-10	60-95	50-95	40-85	30-80	30-40	6-10
	10-30	Channery silt loam, gravelly loam.	SM, SM-SC, GM	A-1, A-2, A-4	5-10	65-90	50-85	40-80	20-50	20-34	NP-7
	30-60	Channery loam, gravelly silt loam.	SM-SC, GM CL-ML,ML	A-1, A-2, A-4	10-15	40-90	25-85	20-80	10-60	20-24	4-6
BbB, BbD----------	0-10	Extremely stony silt loam.	ML, GM, GC, SC	A-2, A-4	10-15	60-95	50-90	40-85	25-80	30-35	6-10
	10-30	Channery silt loam, channery silt loam, gravelly loam.	ML, SM, GM	A-2, A-4	5-10	65-95	50-90	40-75	25-55	20-24	NP-7
	30-60	Channery loam, channery silt loam, gravelly sandy loam.	SM, GM-GC, ML, GM	A-1, A-2, A-4	10-15	40-90	30-85	20-80	10-60	20-24	4-6
Braceville:											
BcB---------------	0-9	Gravelly loam---	ML, CL, SM	A-4, A-2, A-1	0-10	65-90	60-80	40-70	20-55	---	---
	9-27	Gravelly sandy loam, silt loam, gravelly silt loam.	ML, CL, SM, GC	A-2, A-4, A-1	0-10	65-80	60-100	40-100	20-75	15-40	NP-10
	27-72	Gravelly sandy loam, gravelly silt loam.	ML, CL, SM, GC	A-2, A-4, A-1	0-10	65-100	40-75	25-75	15-65	15-40	NP-10
Dumps:											
Da, Db.											
Dystrochrepts:											
[1]DYD:											
Dystrochrepts part.											
[1]DYE:											
Dystrochrepts part.											
Fluvents:											
[1]FA:											
Fluvents part.											
Fluvaquents part.											
Haplaquents:											
HA.											
Holly:											
Hm, Ho------------	0-16	Silt loam-------	ML	A-4	0	90-100	85-100	80-100	70-90	25-35	NP-10
	16-40	Silt loam, loam, silty clay loam.	ML, CL-ML, SM, SM-SC	A-4, A-6	0	85-100	80-100	75-95	45-85	20-40	NP-14
	40-60	Stratified gravelly sandy loam to loam.	ML, SM, SM-SC, GM	A-2, A-4	0-5	70-100	65-100	55-90	20-50	20-40	NP-10

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lackawanna:											
LaB, LaC, LaD-----	0-20	Channery loam---	GM, ML, CL, SM	A-2, A-4	0-15	40-80	40-75	35-70	20-60	---	---
	20-60	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	1-12
LbB, LbD----------	0-10	Extremely stony loam.	ML, CL, GM, SM	A-4, A-2 A-1	5-20	40-80	40-75	35-70	20-60	---	---
	10-20	Channery loam, silt loam, flaggy loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	20-60	Channery loam, channery silt loam, flaggy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	<12
[1]LCE:											
Lackawanna part-	0-10	Extremely stony loam.	ML, CL, GM, SM	A-4, A-2 A-1	5-20	40-80	40-75	35-70	20-60	---	---
	10-20	Channery loam, silt loam, flaggy loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	20-60	Channery loam, channery silt loam, flaggy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	<12
Bath part-------	0-10	Extremely stony silt loam.	ML, GM, GC, SC	A-2, A-4	10-15	60-95	50-90	40-85	25-80	30-35	6-10
	10-30	Channery silt loam, channery silt loam, gravelly loam.	ML, SM, GM	A-2, A-4	5-10	65-95	50-90	40-75	25-55	20-24	2-4
	30-60	Channery loam, channery silt loam, gravelly sandy loam.	SM, GM-GC, ML, GM	A-1, A-2, A-4	10-15	40-90	30-85	20-80	10-60	20-24	4-6
Lordstown:											
LeB, LeC, LeD-----	0-20	Channery silt loam.	ML, GM,SM	A-4	5-20	65-85	50-75	50-75	40-65	<30	NP-4
	20-26	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM,SM	A-2, A-4 A-1	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LfB, LfC----------	0-20	Flaggy silt loam	ML, GM,SM	A-4	5-20	65-85	50-75	50-75	40-65	<30	NP-4
	20-26	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM,SM	A-2, A-4 A-1	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LxB, LxD----------	0-20	Extremely stony silt loam.	ML, GM,SM	A-4	10-20	65-85	50-75	50-75	40-65	<30	NP-4
	20-26	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM,SM	A-2, A-4	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	26	Unweathered bedrock.									

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Mardin:											
McB, McC, McD-----	0-12	Channery silt loam.	GM, ML, CL, SC	A-4	5-20	65-90	60-85	50-70	35-60	25-35	5-10
	12-20	Channery silt loam, channery loam, gravelly loam.	CL, GC SC, CL-ML	A-4	5-10	60-90	55-85	45-70	35-65	15-25	5-10
	20-60	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-90	50-85	40-70	30-65	20-30	5-10
MfB, MfC----------	0-12	Flaggy silt loam	GM, ML, CL, SC	A-4	5-20	65-90	60-85	50-70	35-60	25-35	5-10
	12-20	Channery silt loam, channery loam, gravelly loam.	CL, GC SC, CL-ML	A-4	5-10	60-90	55-85	45-70	35-65	15-25	5-10
	20-60	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
MhB, MhD----------	0-12	Extremely stony loam.	GM, ML, CL, SC	A-4	5-25	65-90	60-85	50-70	35-60	25-35	5-10
	12-20	Channery silt loam, channery loam, gravelly loam.	CL, GC, SC, CL-ML	A-4	5-10	60-90	55-85	45-70	35-65	15-25	5-10
	20-60	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
Medisaprists:											
MK.											
Morris:											
MrA, MrB, MrC-----	0-15	Channery loam---	GC, CL-ML CL, SC	A-4	0-15	60-95	50-75	40-75	35-65	20-30	1-10
	15-65	Channery silt loam, channery loam, channery silty clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9
MsB, MsC----------	0-15	Flaggy loam-----	GC, CL-ML CL, SC	A-4	0-20	60-95	55-75	45-75	35-65	20-30	1-10
	15-65	Channery silt loam, channery loam, channery silty clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9
MxB, MxD----------	0-15	Extremely stony loam.	GC, CL-ML CL, SC	A-4	5-20	60-95	55-80	40-80	35-70	20-30	1-10
	15-65	Channery loam, channery silt loam, channery silty clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Norwich:											
[1]NcA:											
Norwich part----	0-12	Channery silt loam.	GM, ML,SM	A-4, A-7, A-5	10-15	65-90	60-70	60-70	40-65	40-50	5-15
	12-65	Channery silt loam, channery loam, sandy channery loam.	CL, GC, GM-GC,SC	A-4	10-20	65-90	60-70	60	40-65	15-25	5-10
Chippewa part---	0-7	Channery silt loam.	GM, ML, SM	A-7, A-5	5-10	65-90	60-70	50-70	35-65	40-50	5-15
	7-18	Channery silt loam, channery loam, channery very fine sandy loam.	GM, ML, CL,SC-SM	A-4	5-10	65-85	60-85	45-85	35-75	25-35	5-10
	18-60	Channery silt loam, channery loam, channery fine sandy loam	CL, GC, SC, CL-ML	A-2, A-4	10-25	60-80	55-70	45-70	30-65	15-25	5-10
[1]NcB:											
Norwich part----	0-12	Channery silt loam.	GM, ML,SM	A-4, A-7, A-5	10-15	65-90	60-70	60-70	40-65	40-50	5-15
	12-65	Channery silt loam, channery loam, channery fine sandy loam	CL, GC, GM-GC,SC	A-4	10-20	65-90	60-70	60	40-65	15-25	5-10
Chippewa part---	0-7	Channery silt loam.	GM, ML, SM	A-7, A-5	5-10	65-90	60-70	50-70	35-65	40-50	5-15
	7-18	Channery silt loam, channery loam, channery very fine sandy loam.	GM, ML, CL,SC-SM	A-4	5-10	65-85	60-85	45-85	35-75	25-75	5-10
	18-60	Channery silt loam, channery loam, channery fine sandy loam	CL, GL, SC, CL-ML	A-4	5-10	60-80	55-70	45-70	30-65	15-25	5-10
[1]NxB:											
Norwich part----	0-12	Extremely stony silt loam.	GM, ML,SM	A-4, A-7, A-5	15-25	70-90	65-85	60-80	40-75	40-50	5-15
	12-65	Channery silt loam, channery loam, channery fine sandy loam	CL, GC, GM-GC,SC	A-4	10-20	65-90	60-70	60-70	40-65	15-25	5-10
Chippewa part---	0-7	Extremely stony silt loam.	GM, ML, SM	A-7, A-5	5-15	65-90	60-70	50-70	35-65	40-50	5-15
	7-18	Channery silt loam, channery very fine sandy loam.	GM, ML CL, SC-SM	A-4	5-10	65-85	45-85	35-75	35-75	25-35	5-10
	18-60	Channery silt loam, channery loam, channery fine sandy loam	CL, GC, SC, CL-ML	A-4	5-10	60-80	55-70	45-70	30-65	15-25	5-10

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Oquaga:											
OcB, OcC, OcD-----	0-15	Channery loam---	ML, GM,SM	A-4, A-2	5-20	50-85	40-70	35-70	25-65	<25	NP-5
	15-25	Very channery loam, very channery silt loam, channery silt loam.	GM, ML,SM	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
OfB, OfC----------	0-15	Flaggy loam-----	ML, GM	A-4, A-2	5-20	50-85	40-70	35-70	25-65	<25	NP-5
	15-25	Very channery loam, very channery silt loam, channery silt loam.	GM, ML	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
OxB, OxD----------	0-15	Extremely stony loam.	ML, GM,SM	A-4, A-2	10-20	50-85	40-70	35-70	25-65	<25	NP-5
	15-25	Very channery silt loam, very channery loam.	GM, ML,SM	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]OYE:											
Oquaga part-----	0-15	Extremely stony loam.	ML, GM,SM	A-4, A-2	10-20	50-85	40-70	35-70	25-65	<25	NP-5
	15-25	Very channery silt loam, very channery loam.	GM, ML,SM	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lordstown part--	0-20	Extremely stony silt loam.	ML, GM,SM	A-4	10-20	65-85	50-75	50-75	40-65	<30	NP-4
	20-26	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM,SM	A-2, A-4	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Philo:											
Ph----------	0-32	Silt loam-------	ML, SM	A-4	0	95-100	80-100	70-90	45-80	20-40	1-10
	32-60	Stratified sand to silt loam.	GM, SM, ML	A-2, A-4	0	60-95	50-90	40-85	30-85	20-40	1-10
Pits:											
Pk.											
Pope:											
Po, Pp----------	0-37	Fine sandy loam silt loam, loam	SM, ML	A-2, A-4,	0-5	75-100	65-100	40-85	15-55	<20	NP-5
	37-60	Fine sandy loam, sandy loam, gravelly fine sandy loam.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-5	55-100	50-100	35-95	15-70	<30	NP-7
Quarries:											
Qu.											

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Rexford:											
ReA	0-9	Loam	ML, CL, SM,CL-ML	A-4, A-2	0-5	95-100	80-100	75-95	30-90	15-35	NP-10
	9-21	Gravelly sandy loam, loam, silt loam.	ML, SM, GM	A-2, A-4	0-10	60-95	50-90	40-85	25-70	15-35	NP-5
	21-40	Gravelly sandy loam, loam, silt loam.	ML, SM, GM	A-2, A-4	0-15	60-90	50-80	35-65	25-55	<30	NP
	40-60	Stratified sand to gravel.	GW-GM, SW-SM, GW, SP	A-1, A-2	0-20	40-100	30-70	10-40	4-12	<10	NP
Swartswood:											
SwB, SwC, SwD	0-7	Channery loam	SM, ML,GM	A-1, A-2, A-4	0-20	60-90	50-85	30-80	15-65	---	---
	7-24	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	SM, ML,GM	A-1, A-2, A-4	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	24-65	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML,	A-1, A-2, A-4	5-25	50-85	35-80	20-75	10-60	<20	NP-3
SxB, SxD	0-7	Extremely stony loam.	SM, ML,GM	A-2, A-4, A-1	5-20	60-90	50-85	30-80	15-65	---	---
	7-24	Channery loam, flaggy sandy loam, gravelly fine sandy loam.	SM, ML,GM	A-2, A-4, A-1	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	24-65	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML	A-2, A-1, A-4	5-25	50-80	35-80	20-70	10-60	<20	NP-3
Udorthents:											
UA.											
Unadilla:											
UnB, UnC	0-33	Silt loam	ML	A-4	0	100	95-100	90-100	60-90	10-20	2-4
	33-60	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	60-90	10-20	2-4
Urban land:											
Ur, Us.											
Volusia:											
VcA, VcB, VcC	0-12	Channery silt loam.	GM, ML, SM	A-4	5-10	65-75	60-75	50-70	40-65	30-40	5-10
	12-60	Channery silt loam, channery loam, very channery loam.	GM-GC, CL, SC,CL-ML	A-2, A-4	10-25	55-80	50-80	40-65	30-60	20-30	5-10
VfB, VfC	0-12	Flaggy silt loam	GM,ML,SM	A-4	5-10	65-75	60-75	50-70	40-65	30-40	5-10
	12-60	Channery silt loam, loam, channery loam, very channery loam	GM-GC, SC, CL-ML	A-2,A-4	10-25	55-80	50-80	90-65	30-60	20-30	5-10

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Volusia:											
VxB, VxD----------	0-12	Extremely stony silt loam.	SM, ML,GM	A-4	10-20	65-75	65-75	55-75	40-65	30-40	5-10
	12-60	Channery silt loam, channery loam, very channery loam.	GM-GC, CL, SC, CL-ML	A-4, A-2	10-25	55-80	50-80	40-75	30-60	20-30	5-10
Wellsboro:											
WcB, WcC, WcD-----	0-3	Channery loam---	ML, CL, SM	A-2, A-4	0-15	70-90	65-85	60-80	30-60	---	---
	3-23	Loam, channery silt loam, gravelly loam.	ML, CL, SM, SC	A-2, A-4	0-15	70-100	60-100	55-95	30-70	15-40	NP-10
	23-60	Loam, channery sandy loam, gravelly silt loam.	SC, GC, CL,CL-ML	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
WfB, WfC----------	0-3	Flaggy loam-----	ML, CL, SM	A-2, A-4	0-20	70-90	60-85	55-80	30-70	---	---
	3-23	Flaggy loam, channery silt loam, gravelly loam.	ML, CL, SM, SC	A-2, A-4	0-15	70-100	60-100	55-95	30-70	15-40	NP-10
	23-60	Loam, channery sandy loam, gravelly silt loam.	SC, GC, CL-ML,CL	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
WgB, WgD----------	0-3	Extremely stony loam.	ML, CL, SM	A-4, A-2	10-20	70-90	65-85	60-80	30-70	---	---
	3-23	Loam, channery silt loam, gravelly loam.	SC, ML, CL, SM	A-2, A-4	0-15	70-100	60-100	55-95	30-70	15-40	NP-10
	23-60	Loam, channery silt loam, channery loam.	GC,CL-ML CL, SC	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
Wurtsboro:											
WkB, WkC----------	0-8	Channery loam---	SM, GM	A-2, A-4	0-10	70-95	65-90	55-85	30-50	---	---
	8-21	Fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-15	70-95	65-90	55-85	30-50	<30	NP-4
	21-60	Gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-20	60-95	50-90	40-80	30-50	<25	NP-4
WxB, WxD----------	0-8	Extremely stony loam.	SM, GM	A-2, A-4	5-15	70-95	65-90	55-85	30-50	---	---
	8-21	Fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-15	70-95	65-90	55-85	30-50	<30	NP-4
	21-60	Gravelly sandy loam, channery loam.	SM, GM, ML, SP-SM	A-1, A-2, A-4	0-20	50-95	30-90	20-80	10-70	<25	NP-4

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Wyoming:											
WyA, WyB, WyC, WyD, WyE----------	0-7	Gravelly sandy loam.	SM, SW-SM, GM	A-1, A-2	0-15	40-90	30-70	10-60	8-35	<30	NP-5
	7-25	Gravelly sandy loam, very gravelly sandy loam.	SM, GM, GW, GM	A-1, A-2	0-25	40-75	35-65	5-55	5-35	<30	NP-5
	25-60	Very gravelly loamy sand, very gravelly sand.	GW, GW-GM SP, SW	A-1	5-30	30-65	20-55	5-50	1-12	<25	NP-5

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In per hr	In per in	pH					
Arnot:									
ArC----------	0-9	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	2
	9-19	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	
	19	---	---	---	----------	----------	----------	---	
[1]AsB:									
Arnot part------	0-9	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	2
	9-19	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	
	19	---	---	---	----------	----------	----------	---	
Rock outcrop part.									
[1]AsD:									
Arnot part------	0-9	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	2
	9-19	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	
	19	---	---	---	----------	----------	----------	---	
Rock outcrop part.									
[1]ASE:									
Arnot part------	0-9	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	2
	9-19	0.6-2.0	0.08-0.12	4.5-6.0	Low-------	Low----------	High----------	0.17	
	19	---	---	---	----------	----------	----------	---	
Rock outcrop part.									
Atherton:									
At----------	0-9	0.6-2.0	0.16-0.21	5.1-7.3	Low-------	High----------	Moderate-------	0.32	3
	9-36	0.6-2.0	0.10-0.19	5.1-6.5	Low-------	High----------	Moderate-------	0.28	
	36-60	0.06-0.2	0.05-0.12	5.6-6.5	Low-------	High----------	Moderate-------	0.24	
Bath:									
BaB, BaC, BaD-----	0-10	0.6-2.0	0.10-0.20	4.5-6.0	Low-------	Moderate------	Moderate-------	0.17	3
	10-30	0.6-2.0	0.08-0.18	4.5-6.0	Low-------	Moderate------	Moderate-------	0.28	
	30-60	0.06-0.2	0.01-0.06	4.5-6.5	Low-------	Moderate------	Moderate-------	0.28	
BbB, BbD----------	0-10	0.6-2.0	0.10-0.20	4.5-6.0	Low-------	Moderate------	Moderate-------	0.24	3
	10-30	0.6-2.0	0.08-0.18	4.5-6.0	Low-------	Moderate------	Moderate-------	0.28	
	30-60	0.06-0.2	0.01-0.06	4.5-6.5	Low-------	Moderate------	Moderate-------	0.28	
Braceville:									
BcB----------	0-9	0.2-2.0	0.08-0.12	4.5-6.0	Low-------	Moderate------	Moderate-------	0.20	3-2
	9-27	0.2-2.0	0.08-0.12	4.5-6.0	Low-------	Moderate------	Moderate-------	0.20	
	27-72	0.06-0.6	0.06-0.10	4.5-6.0	Low-------	Moderate------	Moderate-------	0.28	
Dumps:									
Da, Db.									
Dystrochrepts:									
[1]DYD:									
Dystrochrepts part.									
[1]DYE:									
Dystrochrepts part.									

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In per hr	In per in	pH					
Fluvents:									
[1]FA:									
Fluvents part.									
Fluvaquents part.									
Holly:									
Hm, Ho	0-16	0.6-2.0	0.15-0.19	5.6-6.5	Low	High	Moderate	---	---
	16-40	0.2-0.6	0.13-0.17	5.1-6.5	Low	High	Moderate	---	
	40-60	0.6-6.0	0.08-0.12	5.6-6.5	Low	High	Moderate	---	
Lackawanna:									
LaB, LaC, LaD	0-10	0.6-2.0	0.10-0.14	4.5-5.5	Low	Low	Moderate	0.17	3-2
	10-20	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	Moderate	0.28	
	20-60	0.06-0.2	0.06-0.12	4.5-6.0	Low	Low	Moderate	0.28	
LbB, LbD	0-10	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.17	3-2
	10-20	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	20-60	0.06-0.2	0.06-0.12	4.5-6.0	Low	Low	High	0.28	
[1]LCE:									
Lackawanna part	0-10	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	Moderate	0.17	3-2
	10-20	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	Moderate	0.28	
	20-60	0.06-0.2	0.06-0.12	4.5-6.0	Low	Low	Moderate	0.28	
Bath part	0-10	0.6-2.0	0.10-0.20	4.5-6.0	Low	Moderate	Moderate	0.24	3
	10-30	0.6-2.0	0.08-0.18	4.5-6.0	Low	Moderate	Moderate	0.28	
	30-60	0.06-0.2	0.01-0.06	4.5-6.5	Low	Moderate	Moderate	0.28	
Lordstown:									
LeB, LeC, LeD, LfB, LfC, LxB, LxD	0-20	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	20-26	0.6-2.0	0.05-0.14	5.1-6.0	Low	Low	High	0.28	
	26	---	---	---	---	---	---	---	
Mardin:									
McB, McC, McD, MfB, MfC	0-12	0.6-2.0	0.11-0.17	4.5-6.0	Low	Moderate	Moderate	0.20	3
	12-20	0.6-2.0	0.09-0.16	4.5-6.0	Low	Moderate	Moderate	0.28	
	20-60	<0.2	0.01-0.03	4.5-6.0	Low	Moderate	Moderate	0.28	
MhB, MhD	0-12	0.6-2.0	0.11-0.17	4.5-6.0	Low	Moderate	Moderate	0.20	3
	12-20	0.6-2.0	0.09-0.16	4.5-6.0	Low	Moderate	Moderate	0.28	
	20-60	<0.2	0.01-0.03	4.5-6.0	Low	Moderate	Moderate	0.28	
Medisaprists:									
MK.									
Morris:									
MrA, MrB, MrC	0-15	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.24	3-2
	15-65	0.06-0.2	0.06-0.08	5.1-6.5	Low	High	Moderate	0.28	
MsB, MsC	0-15	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.24	3-2
	15-65	0.06-0.2	0.06-0.08	5.1-6.5	Low	High	Moderate	0.28	
MxB, MxD	0-15	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.24	3-2
	15-65	0.06-0.2	0.06-0.08	5.1-6.5	Low	High	Moderate	0.28	
Norwich:									
[1]NcA:									
Norwich part	0-12	0.60-2.0	0.12-0.18	5.1-6.5	Low	High	Moderate	0.24	3
	12-65	<0.2	0.02-0.04	5.1-6.0	Low	High	Moderate	0.28	
Chippewa part	0-7	0.6-2.0	0.11-0.18	4.5-5.5	Low	High	Moderate	0.24	3
	7-18	0.6-2.0	0.10-0.17	4.5-5.5	Low	High	Moderate	0.43	
	18-60	<0.2	0.01-0.02	5.1-6.5	Low	High	Moderate	0.28	

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In per hr	In per in	pH					
Norwich:									
[1]NcB:	0-12	0.60-2.0	0.12-0.18	5.1-6.5	Low	High	Moderate	0.24	3
	12-65	<0.2	0.02-0.04	5.1-6.0	Low	High	Moderate	0.28	
Chippewa part	0-7	0.6-2.0	0.11-0.18	4.5-5.5	Low	High	Moderate	0.24	3
	7-18	0.6-2.0	0.10-0.17	4.5-5.5	Low	High	Moderate	0.43	
	18-60	<0.2	0.01-0.02	5.1-6.5	Low	High	Moderate	0.28	
[1]NxB:									
Norwich part	0-12	0.6-2.0	0.12-0.18	5.1-6.5	Low	High	Moderate	0.24	3
	12-65	<0.2	0.02-0.04	5.1-6.0	Low	High	Moderate	0.28	
Chippewa part	0-7	0.6-2.0	0.11-0.18	4.5-5.5	Low	High	Moderate	0.24	3
	7-18	0.6-2.0	0.10-0.17	4.5-5.5	Low	High	Moderate	0.43	
	18-60	<0.2	0.01-0.02	5.1-6.5	Low	High	Moderate	0.28	
Oquaga:									
OcB, OcC, OcD, OfB, OfC, OxB, OxD	0-15	0.6-2.0	0.08-0.17	4.5-5.5	Low	Low	Moderate	0.24	3
	15-25	0.6-2.0	0.04-0.12	4.5-5.5	Low	Low	Moderate	0.28	
	25	---	---	---	---	---	---	---	
[1]OYE:									
Oquaga part	0-15	0.6-2.0	0.08-0.17	4.5-5.5	Low	Low	Moderate	0.24	3
	15-25	0.6-2.0	0.04-0.12	4.5-5.5	Low	Low	Moderate	0.28	
	25	---	---	---	---	---	---	---	
Lordstown part	0-20	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	20-26	0.6-2.0	0.05-0.14	5.1-6.0	Low	Low	High	0.28	
	26	---	---	---	---	---	---	---	
Philo:									
Ph	0-32	0.2-2.0	0.12-0.20	4.5-6.0	Low	Moderate	High	---	---
	32-60	2.0-20.0	0.06-0.10	4.5-6.0	Low	Moderate	High	---	
Pits:									
Pk.									
Pope:									
Po, Pp	0-37	2.0-6.0	0.07-0.14	4.5-5.5	Low	Low	High	0.28	---
	37-60	0.6-6.0	0.07-0.15	4.5-5.5	Low	Low	High	0.28	
Quarries:									
Qu.									
Rexford:									
ReA	0-9	0.6-2.0	0.14-0.18	4.5-6.0	Low	High	High	0.24	3-2
	9-21	0.06-0.2	0.14-0.18	4.5-6.0	Low	High	High	0.28	
	21-40	0.2-2.0	0.04-0.08	5.1-6.5	Low	High	Moderate	0.28	
	40-60	>2.0	0.03-0.06	5.1-6.5	Low	High	Moderate	0.17	
Swartswood:									
SwB, SwC, SwD, SxB, SxD	0-7	0.6-2.0	0.08-0.12	4.5-5.5	Low	Low	High	0.17	3-2
	7-24	0.6-2.0	0.08-0.12	4.5-5.5	Low	Low	High	0.28	
	24-65	0.06-0.6	0.06-0.10	4.5-5.5	Low	Low	High	0.28	
Udorthents:									
UA.									
Unadilla:									
UnB, UnC	0-33	0.6-2.0	0.18-0.21	4.5-6.0	Low	Low	Moderate	0.49	3
	33-60	0.6-2.0	0.17-0.20	4.5-6.0	Low	Low	Moderate	0.64	
Urban land:									
Ur, Us.									

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In per hr	In per in	pH					
Volusia:									
VcA, VcB, VcC, VfB, VfC	0-12	0.6-2.0	0.11-0.17	4.5-6.5	Low	High	Moderate	0.24	3
	12-60	<0.2	0.01-0.02	5.1-6.5	Low	High	Moderate	0.28	
VxB, VxD	0-12	0.6-2.0	0.14-0.19	4.5-5.5	Low	High	High	0.24	3
	12-60	<0.2	0.01-0.02	5.1-6.5	Low	High	Moderate	0.28	
Wellsboro:									
WcB, WcC, WcD	0-3	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.20	3-2
	3-23	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.28	
	23-60	0.06-0.2	0.06-0.10	4.5-6.0	Low	High	Moderate	0.28	
WfB, WfC	0-3	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.20	3-2
	3-23	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.28	
	23-60	0.06-0.2	0.06-0.10	4.5-6.0	Low	High	Moderate	0.28	
WgB, WgD	0-3	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.28	3-2
	3-23	0.6-2.0	0.10-0.14	4.5-6.0	Low	High	Moderate	0.28	
	23-60	0.06-0.2	0.06-0.10	4.5-6.0	Low	High	Moderate	0.28	
Wurtsboro:									
WkB, WkC	0-8	0.6-2.0	0.10-0.14	4.5-5.5	Low	High	High	0.17	3-2
	8-21	0.6-2.0	0.10-0.14	4.5-5.5	Low	High	High	0.28	
	21-60	0.06-0.2	0.08-0.12	4.5-5.5	Low	High	High	0.28	
WxB, WxD	0-8	0.6-2.0	0.10-0.16	4.5-5.5	Low	High	High	0.24	3-2
	8-21	0.6-2.0	0.10-0.14	4.5-5.5	Low	High	High	0.28	
	21-60	0.06-0.2	0.08-0.12	4.5-5.5	Low	High	High	---	
Wyoming:									
WyA, WyB, WyC, WyD, WyE	0-7	6.0-20	0.06-0.14	3.6-6.0	Low	Low	High	0.17	3
	7-25	6.0-20	0.06-0.09	3.6-6.8	Low	Low	High	---	
	25-60	6.0-20	0.02-0.04	3.6-6.0	Low	Low	High	---	

[1]This map unit is made up of two of more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 15.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern.

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Arnot:										
ArC	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
[1]AsB:										
Arnot part	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Rock outcrop part.										
[1]AsD:										
Arnot part	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Rock outcrop part.										
[1]ASE:										
Arnot part	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Rock outcrop part.										
Atherton:										
At	B/D	None	---	---	0-0.5	Apparent	Nov-Jun	>60	---	High.
Bath:										
BaB, BaC, BaD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>48	---	Moderate.
BbB, BbD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>48	---	Moderate.
Braceville:										
BcB	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate.
Dumps:										
Da, Db.										
Dystrochrepts:										
[1]DYD:										
Dystrochrepts part.										
[1]DYE:										
Dystrochrepts part.										
Fluvents:										
[1]FA:										
Fluvents part.										
Fluvaquents part.										
Haplaquents:										
HA										
Holly:										
Hm, Ho	B/D	Frequent	Very brief	Oct-Apr	0-0.5	Apparent	Nov-Jun	>60	---	High.
Lackawanna:										
LaB, LaC, LaD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>48	---	Moderate.
LbB, LbD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>48	---	Moderate.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Lackawanna:										
[1]LCE:										
Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>48	---	Moderate.
Bath part	C	None	---	---	3.0-6.0	Perched	---	>48	---	Moderate.
Lordstown:										
LeB, LeC, LeD, LfB, LfC, LxB, LxD	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
Mardin:										
McB, McC, McD, MfB, MfC	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	---	Moderate.
MhB, MhD	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	---	Moderate.
Medisaprists:										
MK.										
Morris:										
MrA, MrB, MrC, MsB, MsC, MxB, MxD	C	None	---	---	0.5-1.5	Perched	Nov-Mar	>60	---	High.
Norwich:										
[1]NcA:										
Norwich part	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	High.
Chippewa part	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	High.
[1]NcB:										
Norwich part	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	High.
Chippewa part	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	Hihg.
[1]NxB:										
Norwich part	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	High.
Chippewa part	D	None	---	---	0.0-0.5	Perched	Nov-May	>60	---	High.
Oquaga:										
OcB, OcC, OcD, OfB, OfC	C	None	---	---	>6.0	Apparent	Mar-May	20-40	Hard	Moderate.
OxB, OxD	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
[1]OYE:										
Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
Lordstown part	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
Philo:										
Ph	B	Common	Very brief	Oct-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	High.
Pits:										
Pk.										
Pope:										
Po, Pp	B	Rare to common.	Very brief	Oct-Apr	>4.0	Apparent	Feb-Mar	>60	---	Moderate.
Quarries:										
Qu.										
Rexford:										
ReA	C	None	---	---	0.5-1.5	Perched	Nov-Mar	>60	---	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Swartswood: SwB, SwC, SwD, SxB, SxD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>60	---	Moderate.
Udorthents, strip mine: UA.										
Unadilla: UnB, UnC	B	None	---	---	>6.0	---	---	>60	---	Hihg.
Urban land: Ur, Us.										
Volusia: VcA, VcB, VcC, VfB, VfC, VxB, VxD	C	None	---	---	0.5-1.5	Perched	Nov-Mar	>60	---	High.
Wellsboro: WcB, WcC, WcD, WfB, WfC, WgB, WgD	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	---	Moderate.
Wurtsboro: WkB, WkC	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate.
WxB, WxD	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate.
Wyoming: WyA, WyB, WyC, WyD, WyE	A	None	---	---	>6.0	---	---	>120	---	Moderate.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

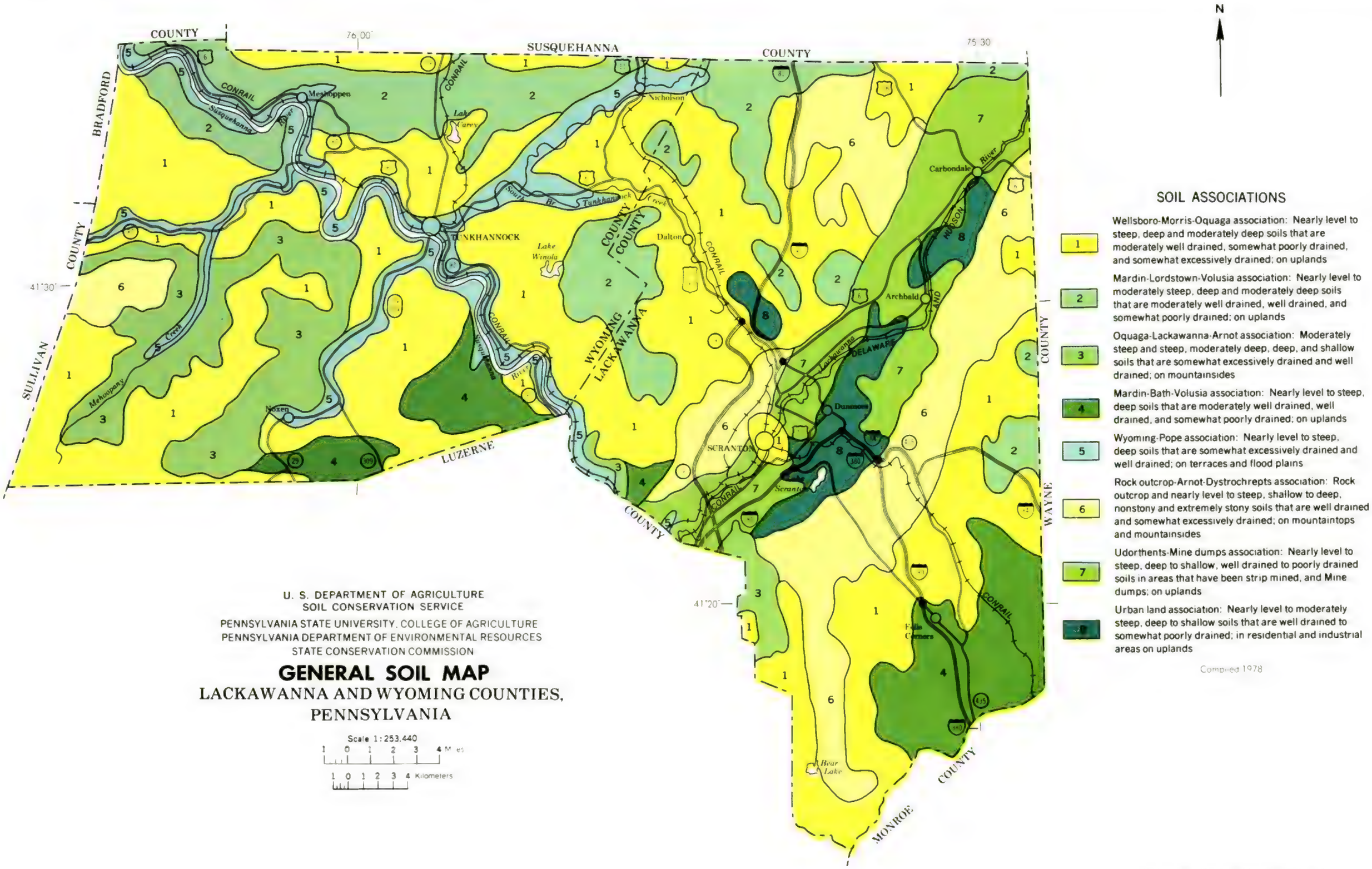
Soil name	Family or higher taxonomic class
Arnot	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Atherton	Fine-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Bath	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Braceville	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Chippewa	Fine-loamy, mixed, mesic Typic Fragiaquepts
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Lackawanna	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Mardin	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Morris	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Norwich	Fine-loamy, mixed, mesic Typic Fragiaquepts
Oquaga	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Philo	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Rexford	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Swartswood	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Unadilla	Coarse-silty, mixed, mesic Typic Dystrochrepts
Volusia	Fine-loamy, mixed, mesic Aeric Fragiaquepts
Wellsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Wurtsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Wyoming	Loamy-skeletal, mixed, mesic Typic Dystrochrepts

☆U.S. GOVERNMENT PRINTING OFFICE : 1982—291-906/1098

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PENNSYLVANIA STATE UNIVERSITY, COLLEGE OF AGRICULTURE
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
STATE CONSERVATION COMMISSION

GENERAL SOIL MAP

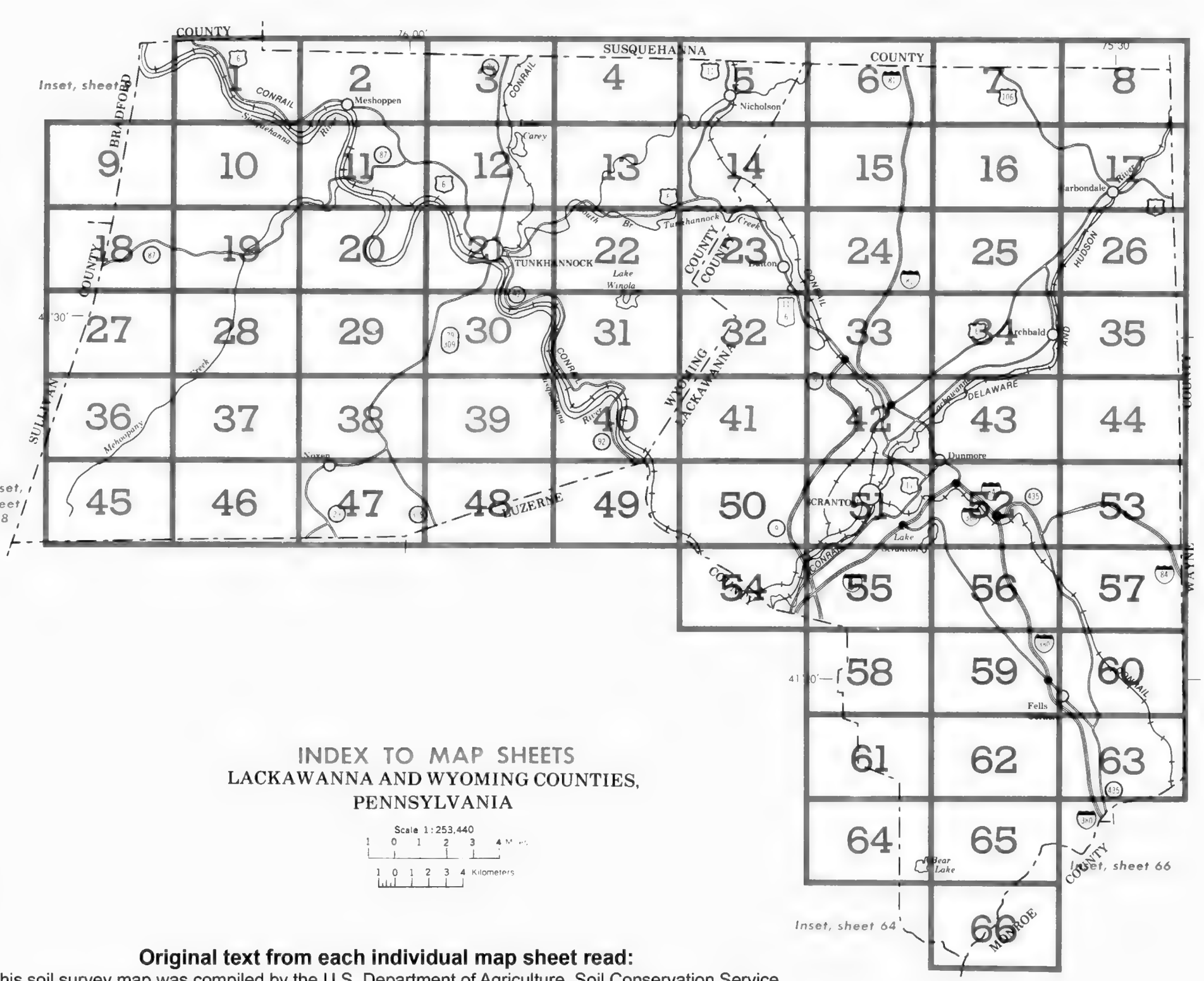
LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers

Original text from each individual map sheet read:

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA

THE PENNSYLVANIA STATE UNIVERSITY, COLLEGE OF AGRICULTURE
THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES, STATE CONSERVATION COMMISSION

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline
- AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (78)
- Federal (476)
- State (92)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; dry)
- Intermittent (dry)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA, FoB2)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Mine opening

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second is usually a small letter but it is a capital letter if the unit is broadly defined. The third letter, A, B, C, D, or E shows the slope. Most symbols without a slope letter are for nearly level soils, but some are miscellaneous areas.

SYMBOL	NAME
ArC	Arnot very channery silt loam, very rocky, 3 to 15 percent slopes
AsB	Arnot Rock outcrop complex, 0 to 8 percent slopes
AsD	Arnot Rock outcrop complex, 8 to 25 percent slopes
ASE	Arnot Rock outcrop complex, steep*
At	Atherton loam, ponded
BaB	Bath channery silt loam, 3 to 8 percent slopes
BaC	Bath channery silt loam, 8 to 15 percent slopes
BaD	Bath channery silt loam, 15 to 25 percent slopes
BbB	Bath extremely stony silt loam, 3 to 8 percent slopes
BbD	Bath extremely stony silt loam, 8 to 25 percent slopes
BcB	Braceville gravelly loam, 2 to 6 percent slopes
Da	Dumps, mine
Db	Dumps, burned mine
DYD	Dystrochrepts and Rock outcrop, moderately steep*
DYE	Dystrochrepts and Rock outcrop, steep*
FA	Fluvents and Fluvaquents*
HA	Haplaquents, stony*
Hm	Holly silt loam
HO	Holly silt loam, ponded
LaB	Lackawanna channery loam, 3 to 8 percent slopes
LaC	Lackawanna channery loam, 8 to 15 percent slopes
LaD	Lackawanna channery loam, 15 to 25 percent slopes
LbB	Lackawanna extremely stony loam, 3 to 8 percent slopes
LbD	Lackawanna extremely stony loam, 8 to 25 percent slopes
LCE	Lackawanna and Bath extremely stony loams, steep*
LeB	Lordstown channery silt loam, 3 to 8 percent slopes
LeC	Lordstown channery silt loam, 8 to 15 percent slopes
LeD	Lordstown channery silt loam, 15 to 25 percent slopes
LfB	Lordstown flaggy silt loam, 3 to 8 percent slopes
LfC	Lordstown flaggy silt loam, 8 to 15 percent slopes
LxB	Lordstown extremely stony silt loam, 3 to 8 percent slopes
LxD	Lordstown extremely stony silt loam, 8 to 25 percent slopes
McB	Mardin channery silt loam, 3 to 8 percent slopes
McC	Mardin channery silt loam, 8 to 15 percent slopes
McD	Mardin channery silt loam, 15 to 25 percent slopes
MfB	Mardin flaggy silt loam, 3 to 8 percent slopes
MfC	Mardin flaggy silt loam, 8 to 15 percent slopes
MhB	Mardin extremely stony silt loam, 3 to 8 percent slopes
MhD	Mardin extremely stony silt loam, 8 to 25 percent slopes
MK	Medisaprists and Medihemists*
MrA	Morris channery loam, 0 to 3 percent slopes
MrB	Morris channery loam, 3 to 8 percent slopes
MrC	Morris channery loam, 8 to 18 percent slopes
MsB	Morris flaggy loam, 3 to 8 percent slopes
MsC	Morris flaggy loam, 8 to 15 percent slopes
MxB	Morris extremely stony loam, 0 to 8 percent slopes
MxD	Morris extremely stony loam, 8 to 25 percent slopes
NcA	Norwich and Chippewa channery silt loams, 0 to 3 percent slopes
NcB	Norwich and Chippewa channery silt loams, 3 to 8 percent slopes
NxB	Norwich and Chippewa extremely stony silt loams, 0 to 8 percent slopes
OcB	Oquaga channery loam, 3 to 8 percent slopes
OcC	Oquaga channery loam, 8 to 15 percent slopes
OcD	Oquaga channery loam, 15 to 25 percent slopes
OfB	Oquaga flaggy loam, 3 to 8 percent slopes
OfC	Oquaga flaggy loam, 8 to 15 percent slopes
OxB	Oquaga extremely stony loam, 3 to 8 percent slopes
OxD	Oquaga extremely stony loam, 8 to 25 percent slopes
OYE	Oquaga and Lordstown extremely stony loams, steep*
Ph	Philo silt loam
PK	Pits, gravel
Po	Pope soils
Pp	Pope soils, rarely flooded
Qu	Quarries
ReA	Rexford loam, 0 to 5 percent slopes
SwB	Swartswood channery loam, 3 to 8 percent slopes
SwC	Swartswood channery loam, 8 to 15 percent slopes
SwD	Swartswood channery loam, 15 to 25 percent slopes
SxB	Swartswood extremely stony loam, 3 to 8 percent slopes
SxD	Swartswood extremely stony loam, 8 to 25 percent slopes
UA	Udorthents, strip mine*
UnB	Unadilla silt loam, 3 to 8 percent slopes
UnC	Unadilla silt loam, 8 to 15 percent slopes
Ur	Urban land
Us	Urban land, occasionally flooded
VcA	Volusia channery silt loam, 0 to 3 percent slopes
VcB	Volusia channery silt loam, 3 to 8 percent slopes
VcC	Volusia channery silt loam, 8 to 18 percent slopes
VfB	Volusia flaggy silt loam, 3 to 8 percent slopes
VfC	Volusia flaggy silt loam, 8 to 15 percent slopes
VxB	Volusia extremely stony silt loam, 0 to 8 percent slopes
VxD	Volusia extremely stony silt loam, 8 to 25 percent slopes
WcB	Wellsboro channery loam, 3 to 8 percent slopes
WcC	Wellsboro channery loam, 8 to 15 percent slopes
WcD	Wellsboro channery loam, 15 to 25 percent slopes
WfB	Wellsboro flaggy loam, 3 to 8 percent slopes
WfC	Wellsboro flaggy loam, 8 to 15 percent slopes
WgB	Wellsboro extremely stony loam, 3 to 8 percent slopes
WgD	Wellsboro extremely stony loam, 8 to 25 percent slopes
WkB	Wurtsboro channery loam, 3 to 8 percent slopes
WkC	Wurtsboro channery loam, 8 to 15 percent slopes
WxB	Wurtsboro extremely stony loam, 3 to 8 percent slopes
WxD	Wurtsboro extremely stony loam, 8 to 25 percent slopes
WyA	Wyoming gravelly sandy loam, 0 to 3 percent slopes
WyB	Wyoming gravelly sandy loam, 3 to 8 percent slopes
WyC	Wyoming gravelly sandy loam, 8 to 15 percent slopes
WyD	Wyoming gravelly sandy loam, 15 to 25 percent slopes
WyE	Wyoming gravelly sandy loam, 25 to 45 percent slopes

* The composition of these units is more variable than others in the survey area, but has been controlled well enough to be interpreted for the expected uses of the soils.

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 1

BRADFORD COUNTY

SUSQUEHANNA COUNTY

WINDHAM

BRAINTRIM

MESHOPPEN

Laceyville

Skinners Eddy

Doolittle

North Flat

Roaring Run

Graves Pond

Walker Pond

Black Walnut Creek

Blue Ridge Mountain

SUSQUEHANNA RIVER

CONRAIL

(Joins inset, sheet 9)

(Joins sheet 10)

(Joins sheet 2)

N

1 Mile

5000 Feet

Scale 1:20000

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 2

(2)

N

1 Mile

5,000 Feet

0

Scale 1:20000

(Joins sheet 1)

SUSQUEHANNA COUNTY

M E S H O P P E N

W A S H I N G T O N

JAYNE BEND

NORTH BRANCH SUSQUEHANNA RIVER

Meshoppen

Meshoppen Creek

M E H O O P A N

CONRAIL

(Joins sheet 11)

(Joins sheet 3)

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 3

4

N

1 Mile 5000 Feet

Scale · 1 : 20000

(Joins sheet 3)

SUSQUEHANNA COUNTY

Phelps Swamp

Pompey Hill

Schlessers Corners

Vargo Hill

Oxbow Lake

Shiloh Pond

Squire Hill

Brush Swamp

CREEK

(Joins sheet 13)

(Joins sheet 5)

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 5

5

N

SUSQUEHANNA COUNTY

WYOMING COUNTY

LACKAWANNA COUNTY

N I C H O L S O N

B E N T O N

Nicholson Hill

Dry Hill

Baylor Mud Pond

Baylors Pond

Pedrick Pond

Spencer Pond

Nicholson

Tunkhannock Creek

Meshoppen Creek

Ph Creek

Qu Creek

Willow Brook

Water

CONRAIL

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 14)

1 Mile

5000 Feet

Scale 1:20000


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 15)
SUSQUEHANNA COUNTY
B E N T O N
G R E E N F I E L D
Pine Hill
Marshbrook
Harding Cemetery
Tunn Hill
Handsome Pond
Smith Corners
Mud Pond
Deer Lake
Kochners Corners
North Church
Sugar Hill
Sicklers Pond
407
81

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 7

7

N

SUSQUEHANNA COUNTY

Crystal Lake

Newton Lake

Mud Pond

Beach Hill

Sicklers Pond

Dundaff

GREENFIELD

(Joins sheet 6)

(Joins sheet 8)

(Joins sheet 16)

1 Mile

5000 Feet

Scale 1:20000

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 8

8

N

1 Mile

5000 Feet

Scale 1:20000

0 1000 2000 3000 4000 5000

SUSQUEHANNA COUNTY

WAYNE COUNTY

Dimmondale

Vandling

Wilson Creek

LACKAWAXEN RIVER

CONRAIL

LACKAWANNA

(Joins sheet 7)

(Joins sheet 17)


BRADFORD COUNTY
BRAINTRIM
WINDHAM
NORTHBRANCH
Rocky Forest
SUSQUEHANNA RIVER
CONRAIL
Sharpe Pond
Negro Pond
Stowell
Run
Creek
water
(Joins sheet 1)
(Joins sheet 10)
(Joins upper right)
(Joins sheet 18)
(Joins inset)
N
1 Mile
5000 Feet
Scale 1:20000

10

N

Scale 1:20000

1 Mile 5000 Feet

(Joins sheet 1)

(Joins sheet 9)

(Joins sheet 19)

(Joins sheet 11)

Negro Pond

Chamberlain Pond

Jennings Pond

Little Round Top

Jenningsville

Stottsville

MESHOPPEN

SUSQUEHANNA RIVER

CONRAIL

NORTH BRANCH

FORKSTON

WINDHAM

MEHOOPANY

Little Wyoming Creek

Little Mehoopany Creek

Mehoopany Creek

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 11

11

N

(Joins sheet 2)

(Joins sheet 12)

(Joins sheet 10)

(Joins sheet 20)

Scale 1:20000

1 Mile 5000 Feet

1000 0 1000 2000 3000 4000 5000

MESHOPPEN water

JAYNE BEND

M E H O O P A N Y

M E S H O P P E N

S H I N G O N

Meshoppen

Florey Knob

Russell Hill

Dorn Blazer Pond

Little Mehoopany

North Mehoopany

Mehoopany Station

Carney Flat

Mehoopany

NORTH BRANCH SUSQUEHANNA RIVER

CONRAIL

Creek

12

N

1 Mile

5000 Feet

Scale 1 : 20000

0 1000 2000 3000 4000 5000

(Joins sheet 3)

(Joins sheet 11)

(Joins sheet 13)

(Joins sheet 21)

WASHINGTON

LEMON

SCRANTON

Mud Pond

Sutton Pond

Lake Carey

Helmar Swamp

Hollow

Kinney Hill

Mt Airy

Cooper Corners

Whippoorwill

Shupp Hill

Prospect Hill

Oak Hill

Cruter Pond

Round Swamp

Glen

Tuppers Creek

Susquehanna River

Baton

water

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 13

13

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 14

14

N

1 Mile

5,000 Feet

Scale 1:20000

(Joins sheet 5)

(Joins sheet 13)

(Joins sheet 23)

(Joins sheet 15)

Spencer Pond

Lake Sheridan

water

Bayley Pond

Lake Kewanee

Numbaka Lake

Camp Kewanee

Fleetville

Factoryville

Factoryville Station

Tunkhannock Creek

South Branch Tunkhannock Creek

LACKAWANNA COUNTY

WYOMING COUNTY

CLINTON

LAPLUME

NORTH ABINGTON

BENTON

Wallville

Fairground Hill

Carpenter Town

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 15

15

N

Scale 1:20000

1 Mile

5000 Feet

0 1000 2000 3000 4000 5000

Fleetville

Bassett Pond

Deer Lake

Davidson Hill

Davidson Corners

Bushkos Hill

Wallsville

Lee Hill

Fairground Hill

Carpenter Town

Kennedy

Frosh Pond

South Branch Tunkhannock Creek

Sarnoski Hill

Church Hill

East Benton

Scott

Ocs Creek

BENTON

GREENFIELD

ABINGTON

SCOTT

(Joins sheet 6)

(Joins sheet 16)

(Joins sheet 14)

(Joins sheet 24)

16

N

Scale 1:20000

1 Mile

5000 Feet

GREENFIELD

SCOTT

CARBONDALE

FELL

Tompkinsville

Graves Pond

Heart Lake

Mountain Mud Pond

O and W Reservoir

Spencers Corners

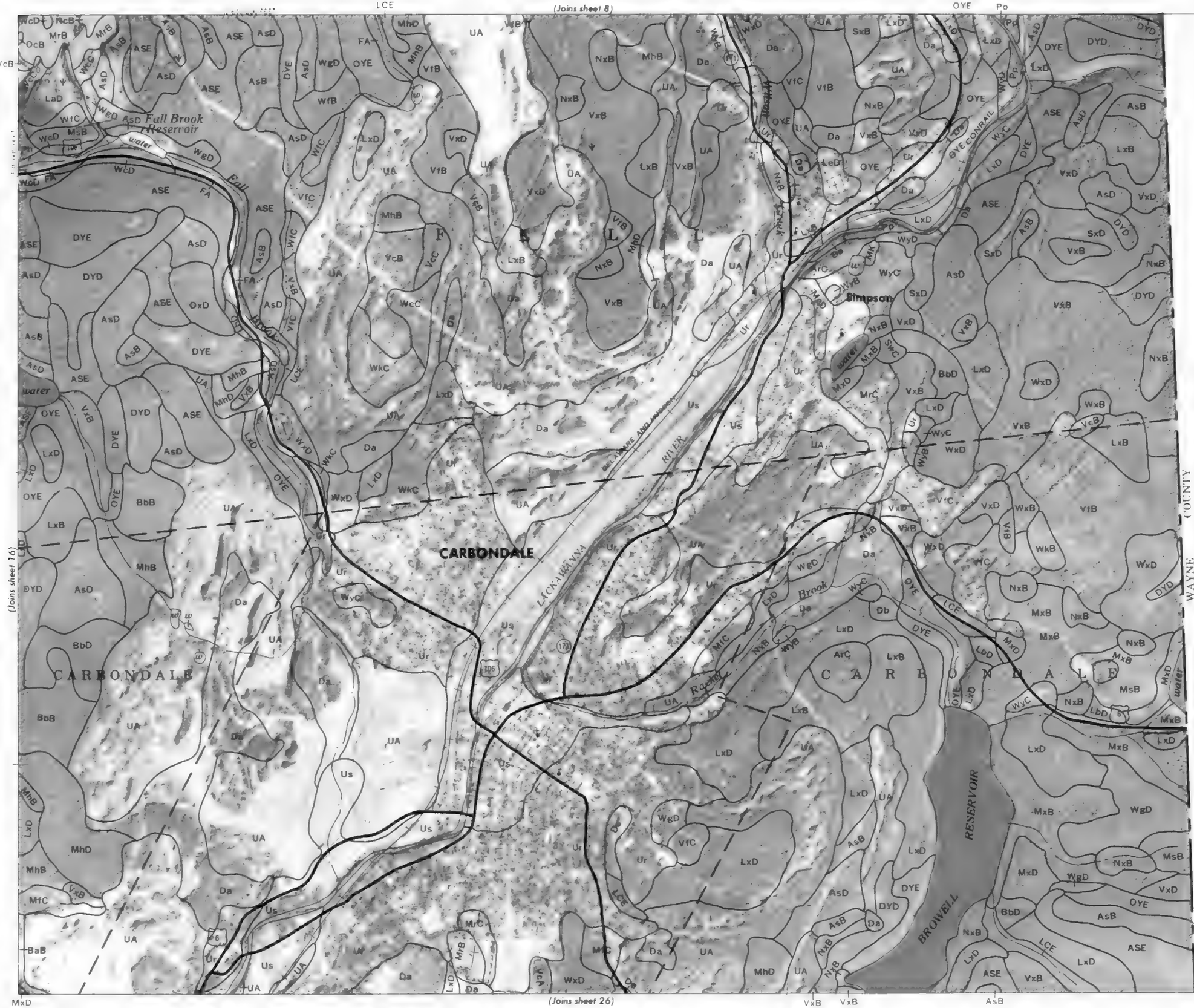
(Joins sheet 7)

(Joins sheet 15)

(Joins sheet 17)

(Joins sheet 25)

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 17



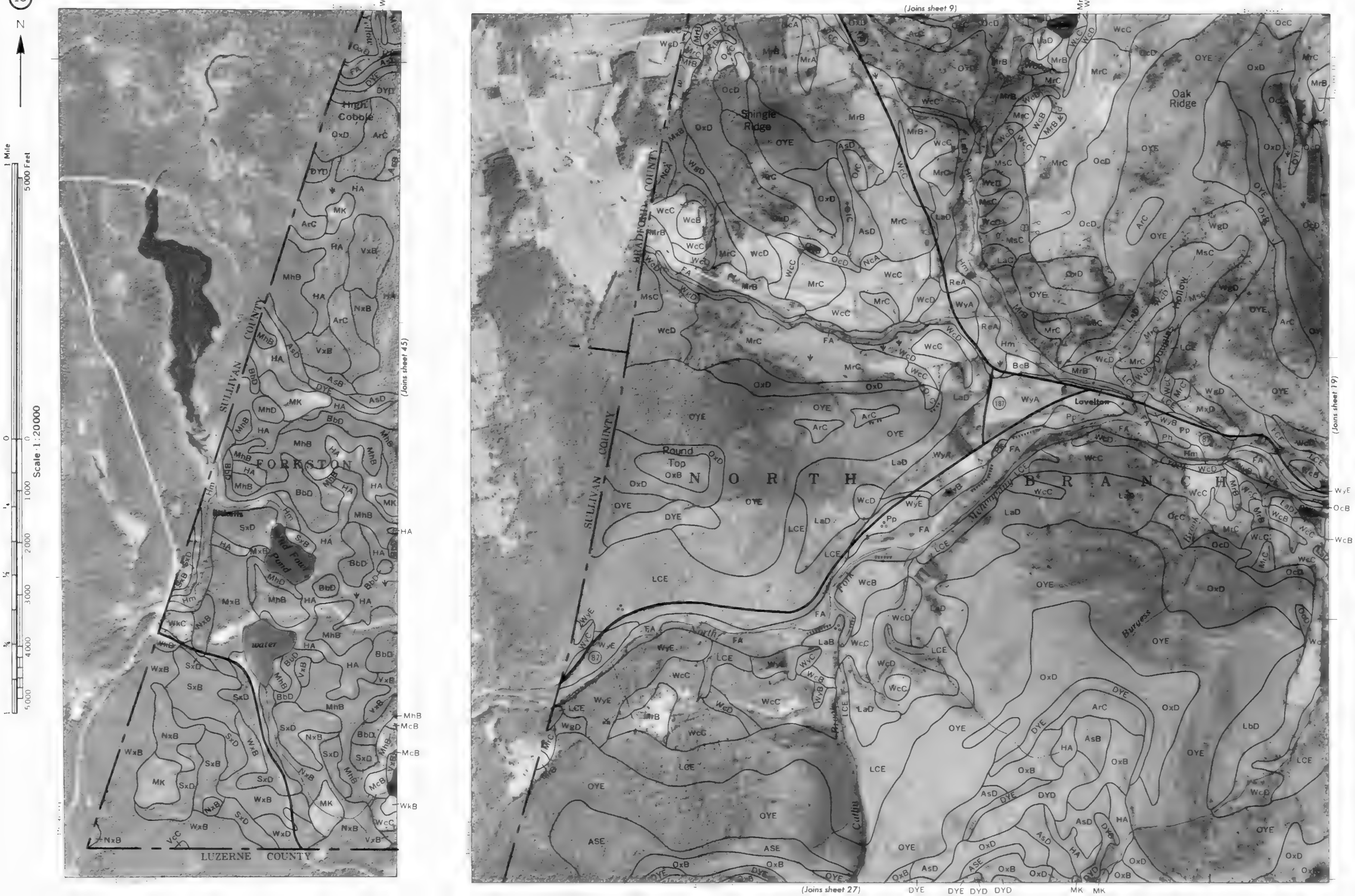
17

N

1 Mile

5000 Feet

Scale 1:20000


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
High Cobble
SULLIVAN COUNTY
FORKSTON
Pond
water
LUZERNE COUNTY
(Joins sheet 45)
(Joins sheet 9)
Shingle Ridge
Oak Ridge
BRADFORD COUNTY
Round Top
N O R T H
B R A N C H
Lovelton
(Joins sheet 19)
(Joins sheet 27)
Burgess
North
Hollow

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 19

N

(Joins sheet 10)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 28)

WINDHAM

MEHOOPANY

NORTH BRANCH

FORKSTON

Douglas Hill

Douglas

Hollow

Fork

Creek

Cedar Hill

Tunket Hole

Forkston

Bowman Hollow

Burgess

Scale 1:20000

1 Mile

5000 Feet

20

N

Scale · 1:20000

1 Mile 5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

(Joins sheet 11)

(Joins sheet 19)

(Joins sheet 29)

(Joins sheet 21)

Maynard Hill

Places Pond

Mehoopany Creek

Mehoopany Mountain

Doll Mountain

Sugar Hollow Creek

Grist Flat

WASHINGTON

NECK

THE

NORTH BRANCH SUSQUEHANNA RIVER

Jayne Pond

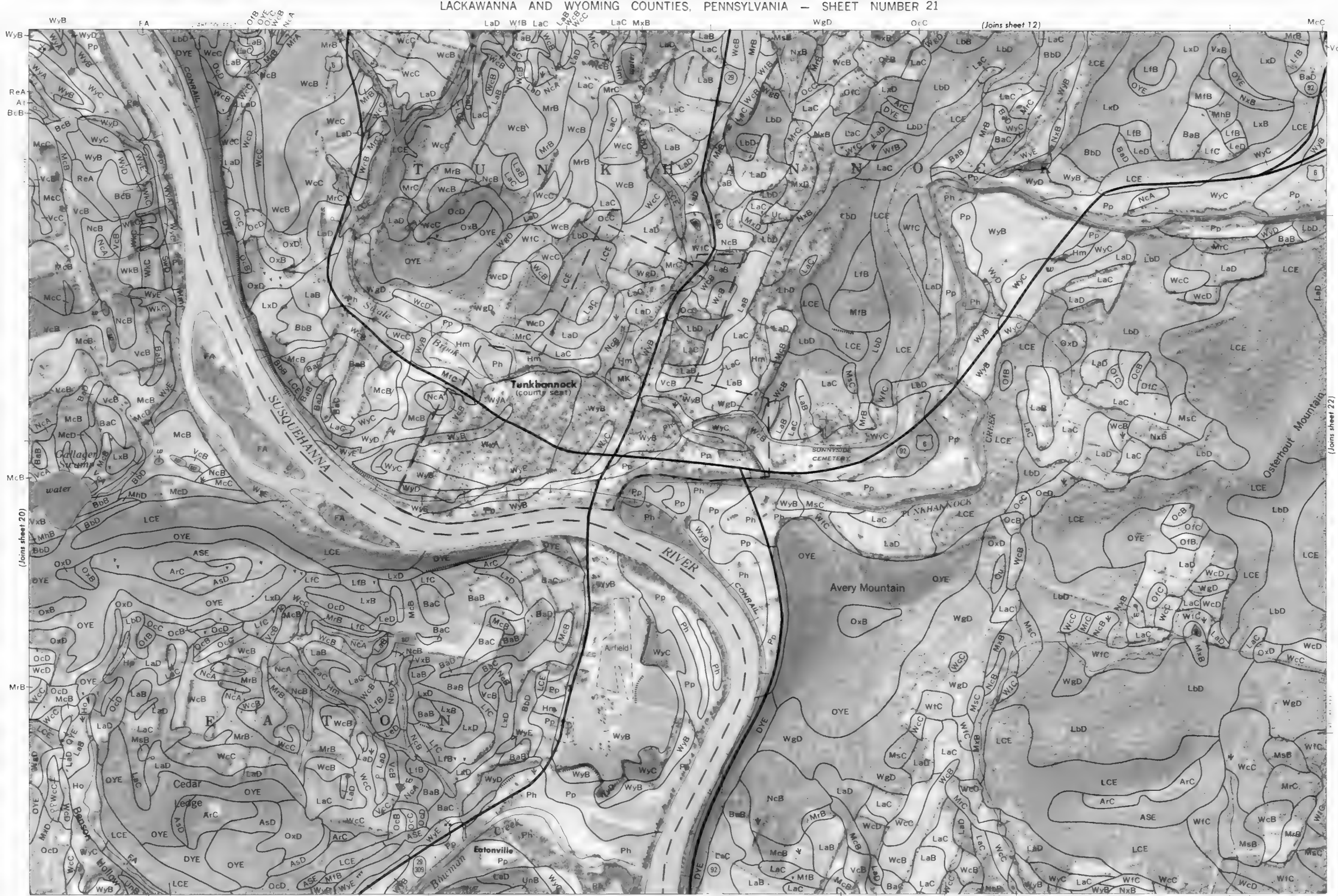
Gallager Swamp

MEHOOPANY

EATON

FORKSTON

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 21




(Joins sheet 13)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 31)
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
T U N K H A N N O C K
C L I N T O N
O V E R F I E L D
Osterhout Mountain
Middle Mountain
East Mountain
German Hill
South Branch Tunkhannock Creek
LITHIA VALLEY
Carpenter Hollow
Lake Winola
Flow Pond
water
OYE
LCE
WgD
WcC
WcB
MsB
MrB
NxB
LaD
LxD
McC
BaD
AsD

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 23

23

N

(Joins sheet 14)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 32)

1 Mile

5,000 Feet

Scale 1:20000

FACTORYVILLE

Tunkhannock Creek

La Plume

CLINTON

LAPLUME

NORTH ABINGTON

SCRANTON SEM

Lilly Lake

Walls Corner

WEST ABINGTON

OVERFIELD

Leggett Creek

Dalton

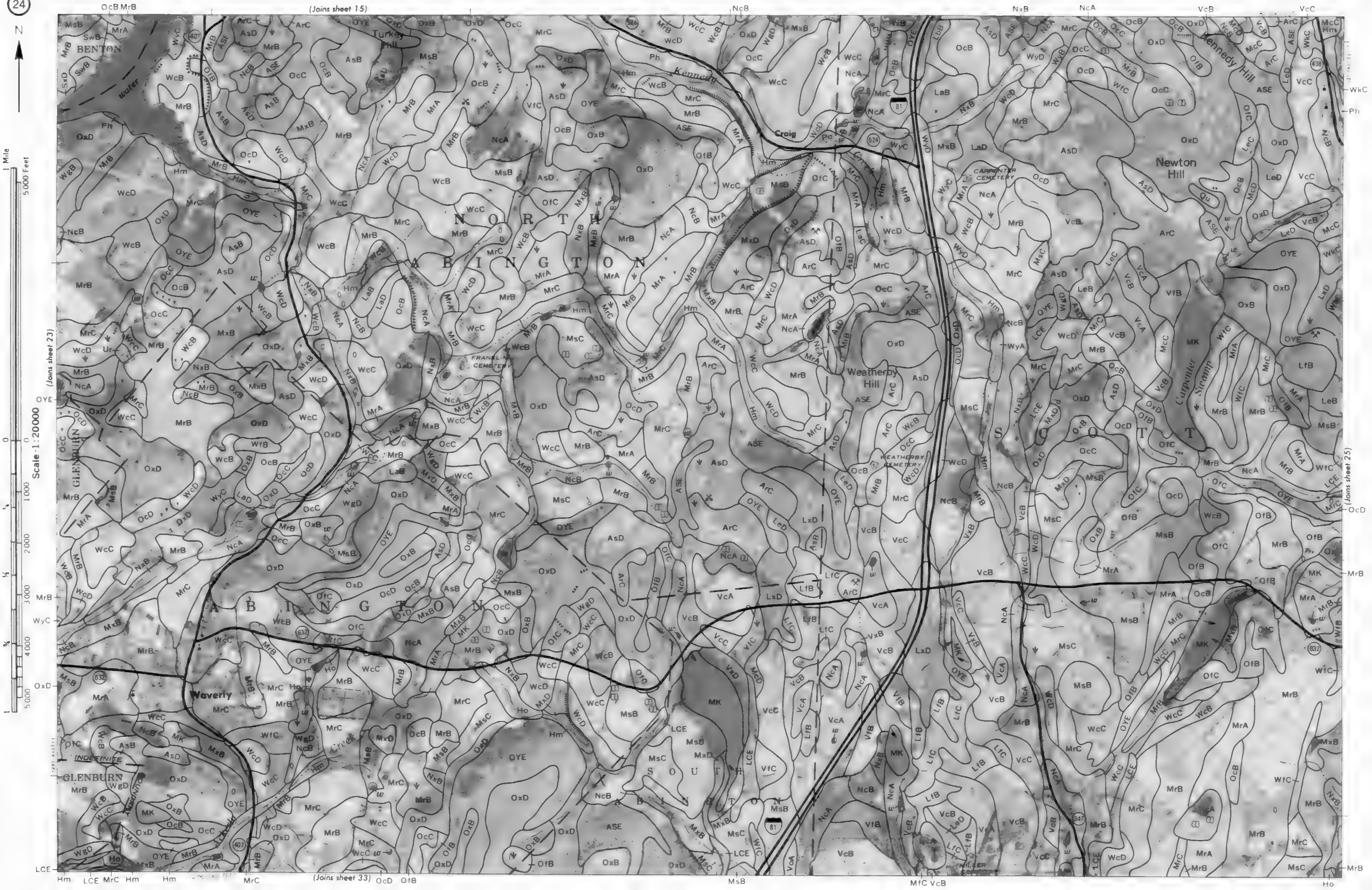
ABINGTON

Glenburn

GLENBURN

CONRAIL

Glenburn Pond


(Joins sheet 15)
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 33)
N
1 Mile
5000 Feet
Scale 1:20000
BENTON
Turkey Hill
Kennedy Creek
Craig
Kennedy Hill
Newton Hill
CARPENTER CEMETERY
NORTH ABINGTON
FRANKLIN CEMETERY
Weatherby Hill
WEATHERBY CEMETERY
Carpenter Swamp
SCOTT
GLENBURN
ABINGTON
Waverly
SOUTH ABINGTON
INDEFINITE
MILLER CEMETERY
water

(Joins sheet 16)

(Joins sheet 24)

(Joins sheet 34)

(Joins sheet 26)

25

N

1 Mile

5000 Feet

Scale 1:20000

Chapman Lake

Rush Brook Reservoir

O and W Reservoir

Carey Mountain

Meyers Mtn

Hubbard Mtn

Mondale

Jermyn

East Jermyn

Mayfield

SCOTT

CARBONDALE

ARCHBALD

Tunkhannock Branch

Rush Brook

Wildcat Creek

Aylesworth Creek

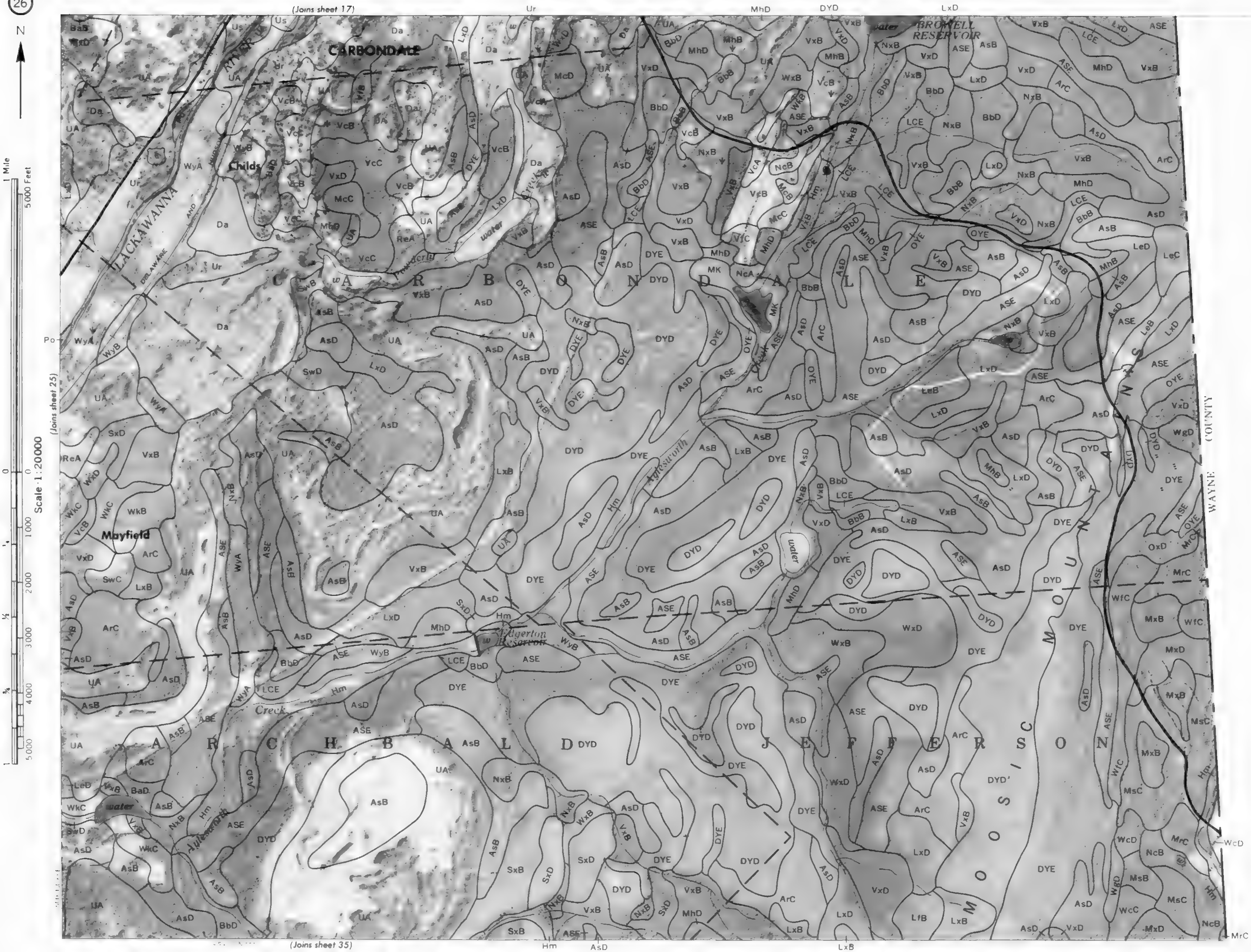
Nebraska

LACKAWANNA RIVER

DELAWARE AND HUDSON

SCOTTS VALLEY CEMETERY

ASSUMPTION CEMETERY


26
N
(Joins sheet 17)
(Joins sheet 25)
(Joins sheet 35)
1 Mile
5000 Feet
Scale 1:20000
CARBONDALE
Childs
Mayfield
BROWELL RESERVOIR
Edgerton Reservoir
LACKAWANNA AND DELAWARE
LACKAWANNA RIVER
CARBONDALE
ARCHBALD
JEFFERSON
MOOSIC MOUNTAINS
WAYNE COUNTY
Aylesworth Creek
water

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 27

27

N

(Joins sheet 18)

(Joins sheet 28)

(Joins sheet 36)

SULLIVAN COUNTY

BARTLETT MOUNTAIN

NORTH BRANCH

FORKSTON

Big Dee Swamp

Crane Swamp

Sanlee Creek

Tamarack Swamp

Red Brook

Stony Brook

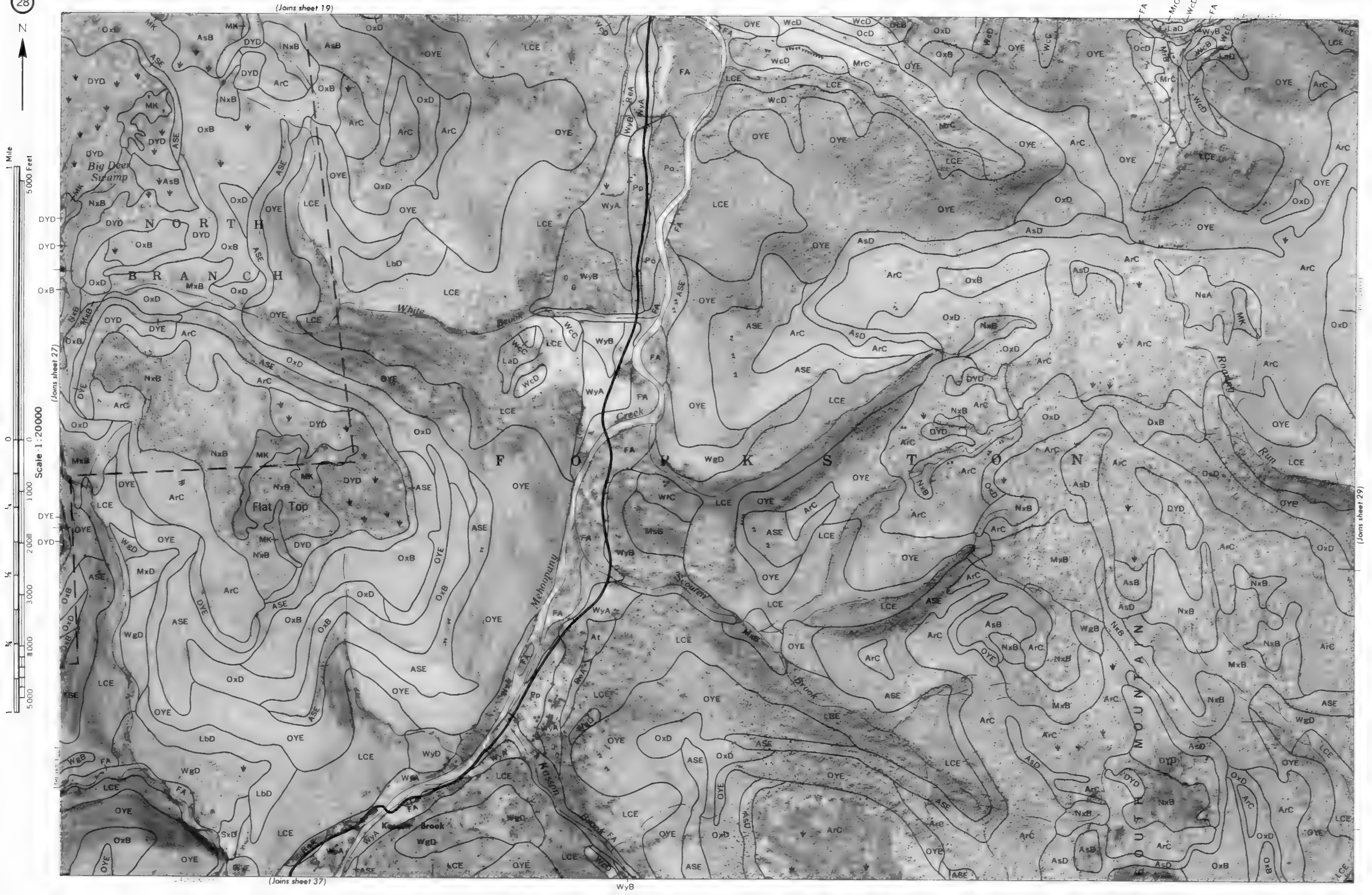
water

OYE OxB OxD DYE HA AsB AsD ASE ArC NxB NxD MxB MxD WgB WgD DYD MK LCE LbD LaB NcB WfB MsB FA

1 Mile

5000 Feet

Scale 1:20000


N
(Joins sheet 19)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 37)
Scale 1:20000
1 Mile
5000 Feet
Big Deer Swamp
NORTH BRANCH
FORKSTON
SOUTH MOUNTAIN
Flat Top
White Brook
Mehoopany Creek
Stowell Brook
Kasson Brook
Roaring Run


29
N
(Joins sheet 20)
(Joins sheet 30)
(Joins sheet 38)
(Joins sheet 28)
MEHOOPANY
FORKSTON MOUNTAIN
FORKSTON
F O R K S T O N
E A T O N
M O N R O E
NOXEN
Roaring Run
Roaring Brook
South Branch
Roote Run
Brook Hollow
Newton Run
Sugar Hollow Creek
Bowman Creek
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 30

30

N

Scale 1:20000

1 Mile 0 5000 Feet

0 1000 2000 3000 4000 5000

(Joins sheet 21)

(Joins sheet 29)

(Joins sheet 39)

(Joins sheet 31)

Bowman Creek

Sugar Hollow

Eatonville

CONRAIL

TUNKHANNOCK

RIVER

SUSQUEHANNA

La Grange Island

Mountain

Miller

Shaver Mountain

NORTH MORELAND

Jenks Creek

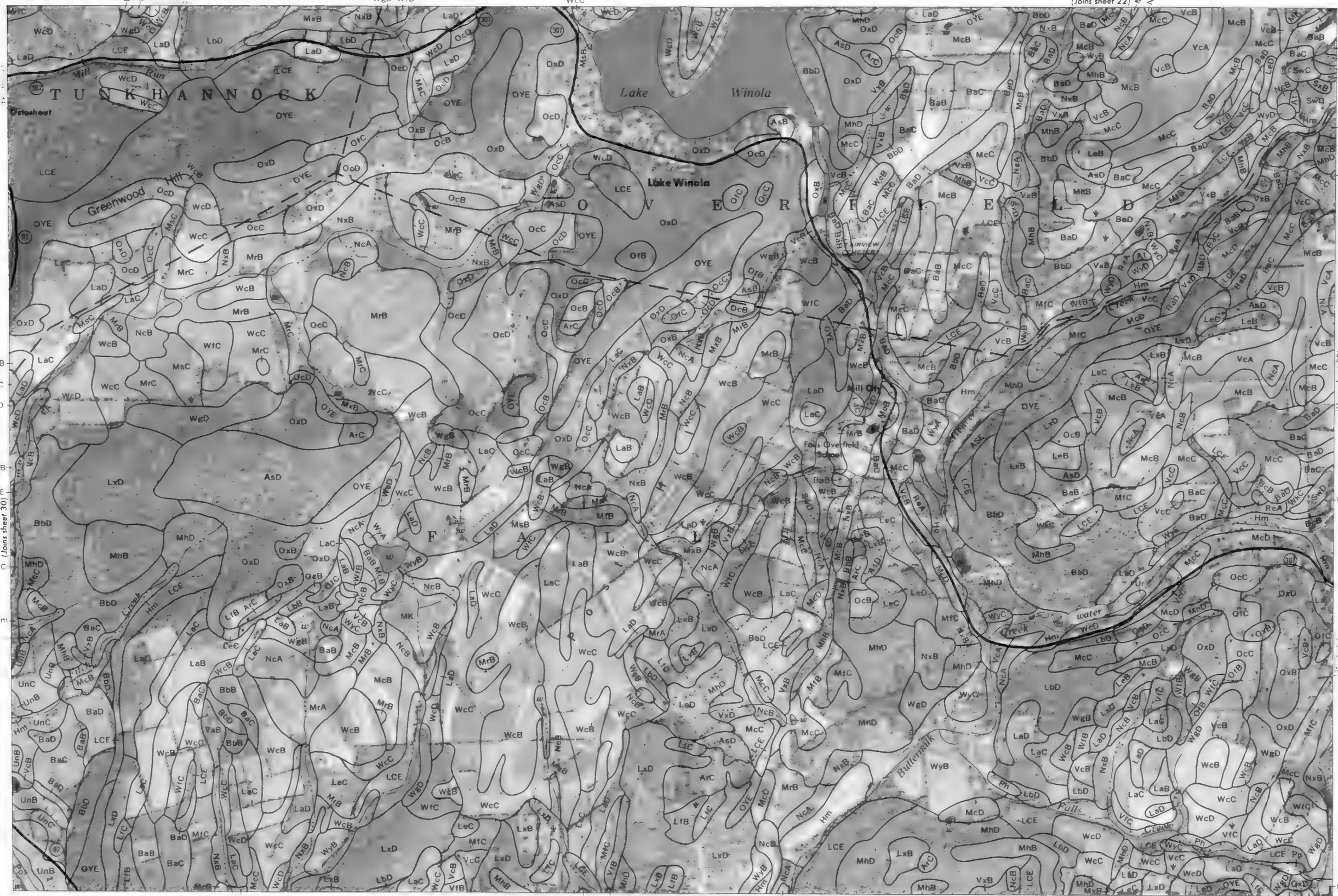
Thurston Hollow

South Eaton

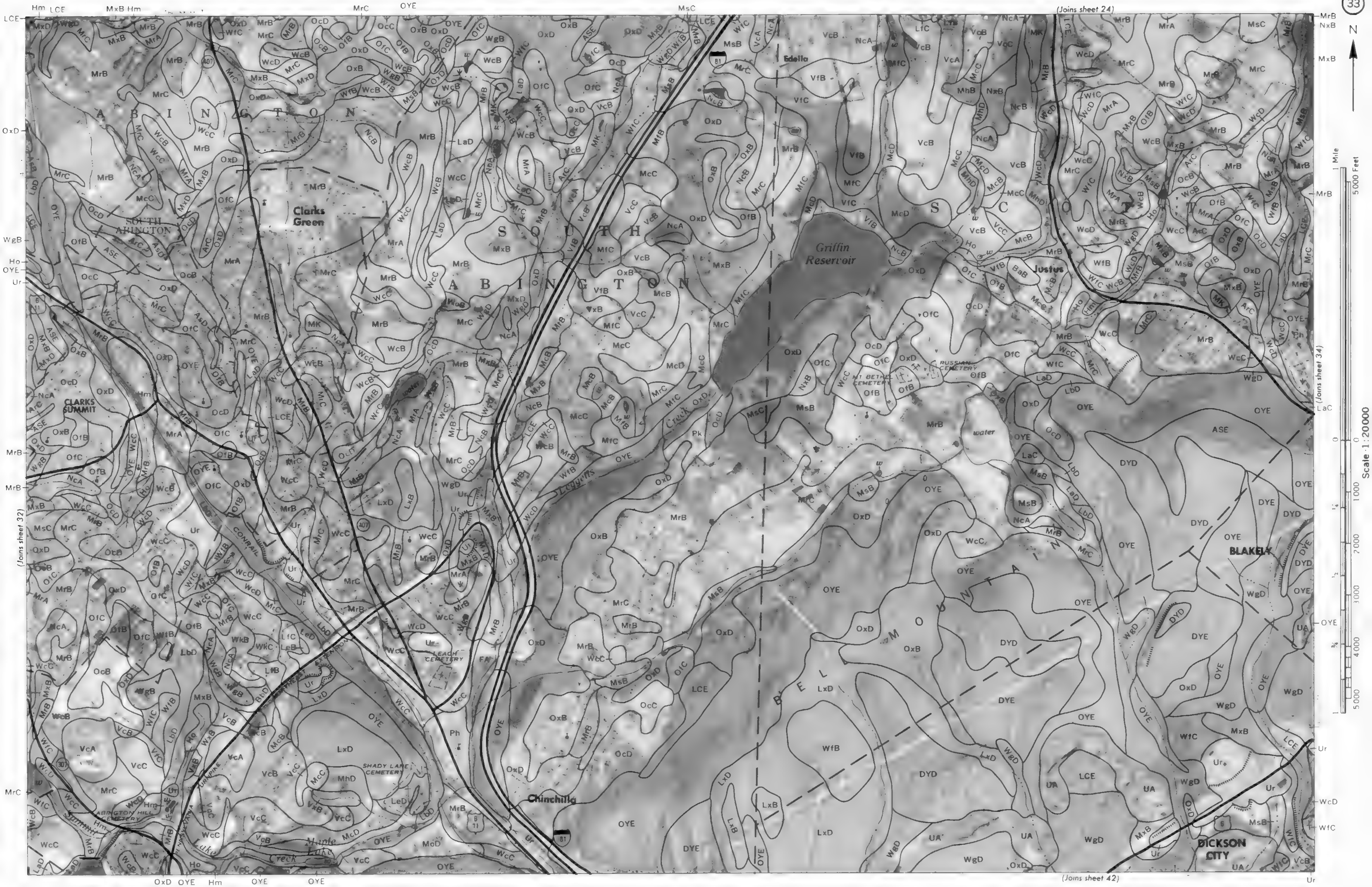
Whites Ferry

FALLS

TUNKHANNOCK


TUNKHANNOCK
Lake Winola
Lake Winola
OVERFIELD
FALLS
Greenwood Hill
Mill Run
Fairview Center
Mill City
Falls Overfield School
Butternilk
Falls Creek
(Joins sheet 22)
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 40)
31
N
1 Mile
5000 Feet
Scale 1:20000


32
N
(Joins sheet 23)
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 41)
1 Mile
5000 Feet
Scale 1:20000
OVERFIELD
Beaver
WEST ABINGTON
FALLS
GLENBURN
SOUTH ABINGTON
NEWTON
WYOMING COUNTY
LACKAWANNA COUNTY
Wilbur Hill
Captain White Hill
Fords Lake
Gravel Pond
Lance Pond
Glenburn Pond
Griffin Hill
Schultzville
SCRANTON AIRPORT
Buttermilk
Creek
Falls
CLARKS SUMMIT
Summit Lake
Corby Swamp
ABINGTON
water


(Joins sheet 24)
(Joins sheet 34)
(Joins sheet 42)
(Joins sheet 32)
N
Scale 1:20000
1 Mile
5000 Feet
SOUTH ABINGTON
Clarks Green
CLARKS SUMMIT
Edella
Griffin Reservoir
Justus
RUSSIAN CEMETERY
MT BETHEL CEMETERY
LEACH CEMETERY
SHADY LANE CEMETERY
ABINGTON HILLS CEMETERY
Leggetts Creek
Chinchilla
BLAKELY
DICKSON CITY
CONRAIL
Summit Lake
Maple Lake
Creek

34

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 25)

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 43)

BLAKELY

DICKSON CITY

OLYPHANT

JESSUP

Peckville

Eynon

Sturgis

Prospect Hill

Grassy Island

ARCHBALD

Riverside

CONRAIL

DELAWARE, LACKAWANNA AND HUDSON

RIVER

Wildcat

Sterry

Creek

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 35

35

N

(Joins sheet 26)

(Joins sheet 34)

(Joins sheet 44)

JEFFERSON

MOOSIC MOUNTAINS

ARCHBALD

WAYNE COUNTY

Indian Cave Run

White Oak Run

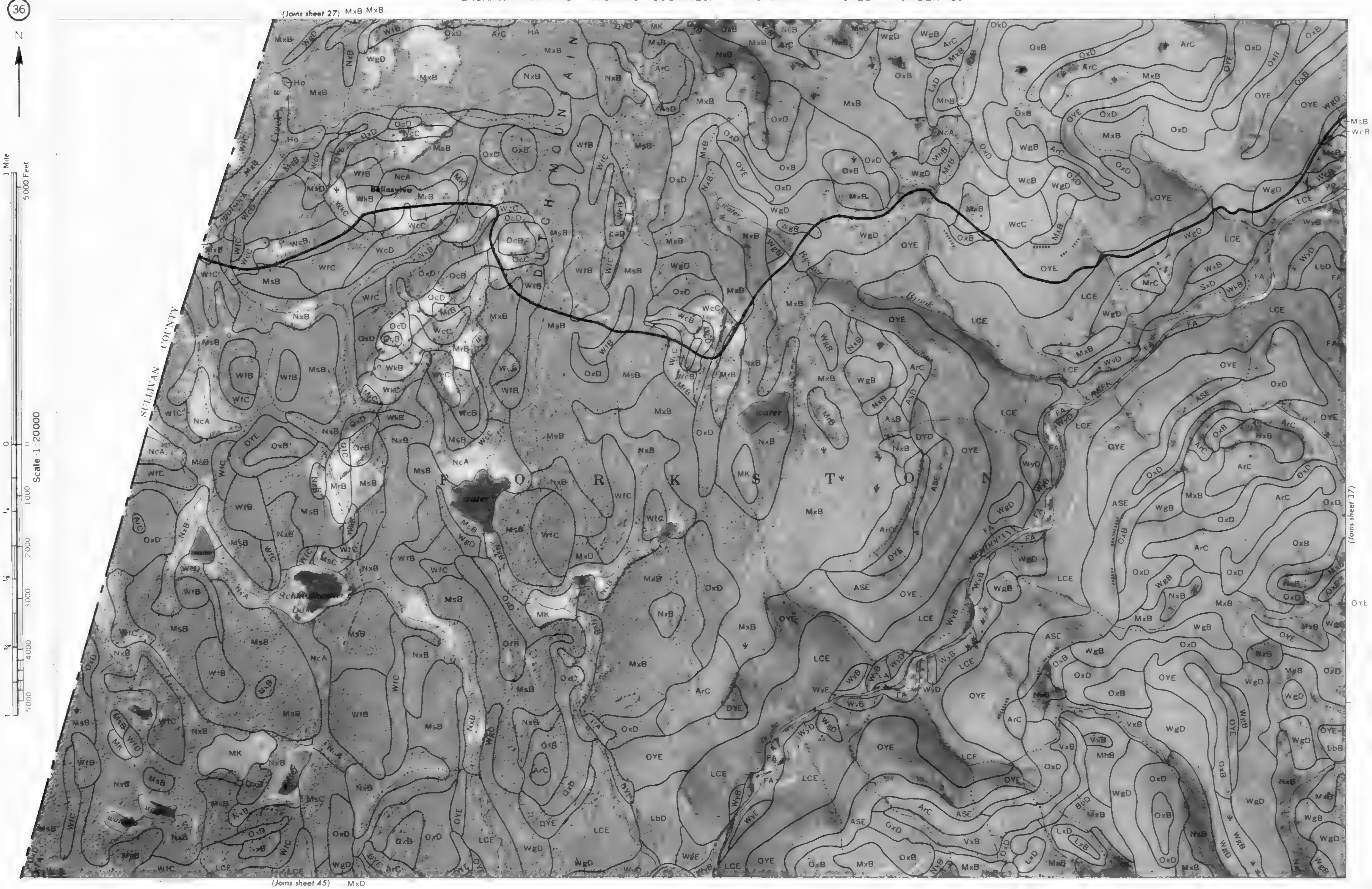
Laurel Run

Municipal Reservoir No 3

1 Mile

5000 Feet

Scale 1:20000


36
N
(Joins sheet 27) MxB MxB
(Joins sheet 37)
(Joins sheet 45) MxD
SULLIVAN COUNTY
DUTCH MOUNTAIN
FORKSTON
Bellasylva
Schoolhouse Lake
water
Scale 1:20000
1 Mile
5000 Feet

N

1 Mile
5000 Feet
Scale · 1:20000

(Joins sheet 28)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 46)

FORKSTON
NOXEN
SOUTH
MEHOOPANY CREEK
Henry Run
Leif Brook
Kassum Brook
Somers Brook
Roaring Run Branch
Smith Run
York Run


38
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 29)
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 47)
FORKSTON
NOXEN
MONROE
EATON
Schooley Mountain
Brier Mountain
Roote
Hollow
Evans Falls
Bowman
Bowman Creek
Hettesheimer Corners
Noxen
Hettesheimer
York Run
Hill
Run
Creek
Mountain Run
Kitchen
Branch
Muddy
29
309
292

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 39

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 40

40

N

1 Mile

5,000 Feet

Scale 1:20000

0 1,000 2,000 3,000 4,000 5,000

(Joins sheet 31)

(Joins sheet 39)

(Joins sheet 49)

(Joins sheet 41)

SUSQUEHANNA RIVER

WEST FALLS

FALLS

WYOMING

LUZERNE CO.

NORTHMORELAND

BATON

FALLSINGTON

WYOMING

CONRAIL

Creek

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 41

41

N

(Joins sheet 32)

(Joins sheet 42)

(Joins sheet 40)

(Joins sheet 50)

Newton Center

Shaffers Corners

Lucky Run

Scale 1:20000

1 Mile

5,000 Feel

42

N

1 Mile

5000 Feet

Scale 1:20000

SOUTH ABINGTON

ABINGTON HILL CEMETERY

West Mountain

NEWTON

RANSOM

Providence

SCRANTON
(county seat)

DICKSON CITY

DUNMORE

EVERGREEN CEMETERY

ST ANTHONYS CEMETERY

DUNMORE CEMETERY

CATHEDRAL CEMETERY

Green Ridge

Leach Creek

Leggetts Creek

CONRAIL

NORTHEAST EXTENSION

LACKAWANNA RIVER

(Joins sheet 33)

(Joins sheet 41)

(Joins sheet 43)

(Joins sheet 51)

N

DICKSON CITY
OLYPHANT
JESSUP
Grassy Island
THROOP
DUNMORE
Eddy Creek
Slurry Creek
Roaring Brook
Little Roaring Brook
Marshwood Reservoir
O'Connor Reservoir
Olyphant Reservoir No. 2
Olyphant Reservoir No. 1
MOOSIC MOUNTAINS
JEFFERSON
ROARING BROOK
Warsaw
Marshwood
CONRAIL
DELAWARE, LACKAWANNA AND WESTERN
HUDSON RIVER

(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 52)
(Joins sheet 34)

1 Mile
5,000 Feet
Scale 1:20000

(44)

N

Scale 1:20000

1 Mile 5,000 Feet

0 0

¼ 1000

½ 2000

¾ 3000

1 4000

1¼ 5000

(Joins sheet 35)

(Joins sheet 43)

(Joins sheet 53)

MOOSIC MOUNTAINS

JESSUP

Grassy Island Creek

West Branch Wallenpaupack Creek

Moosic Lakes

Kizer Pond

Half Moon Lake

Spangenberry Lake

Red Oak

Cortez

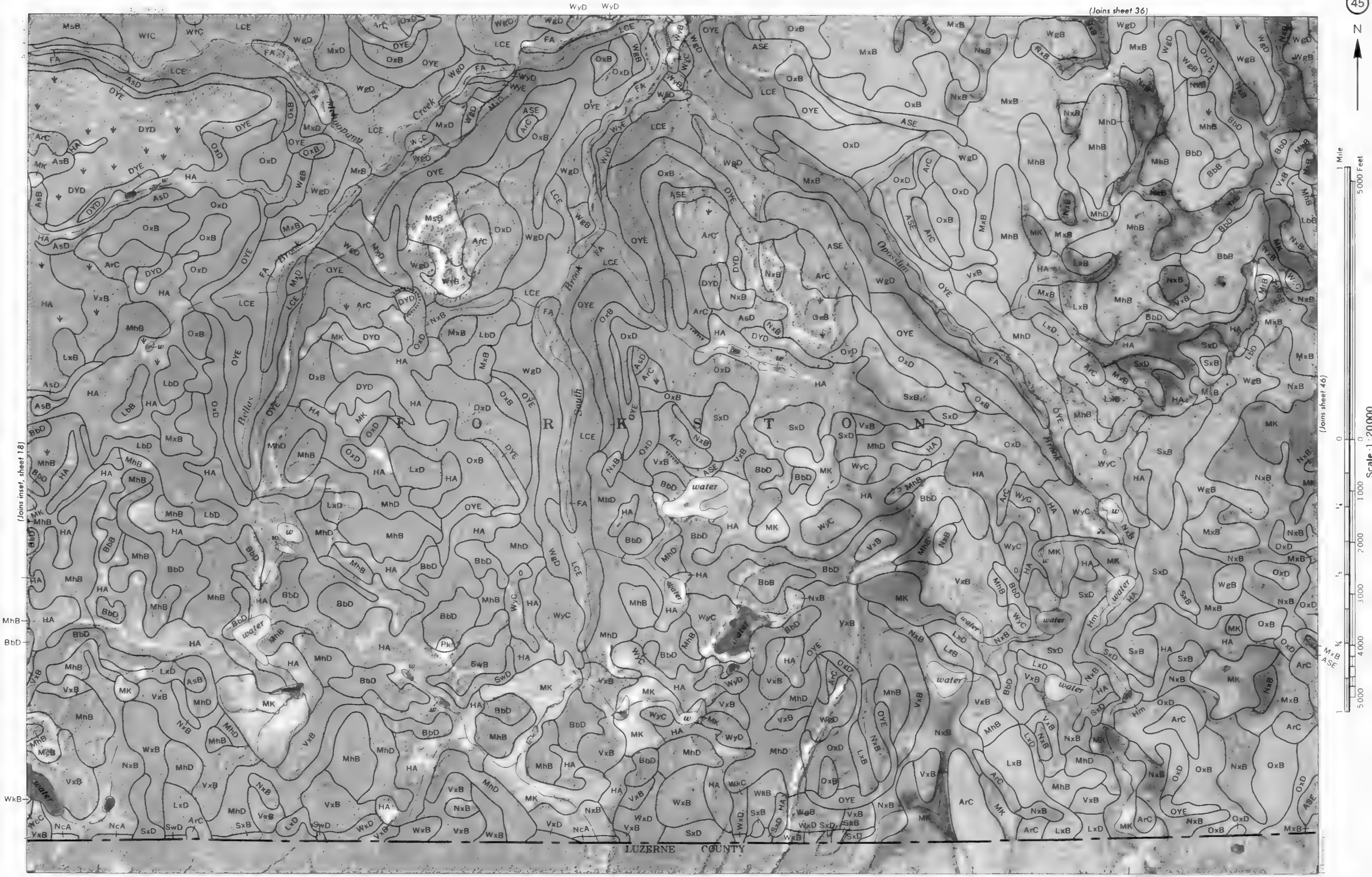
KIZER CEMETERY

water

247

WAYNE COUNTY

VfB WgD WgD OfC Po Hm Ph MK MsB


(Joins sheet 36)
(Joins sheet 46)
(Joins inset, sheet 18)
N
Scale 1:20000
1 Mile
5000 Feet
FORKSTON
LUZERNE COUNTY
Mehoopany Creek
Bellas Brook
South Brook
Opossum Brook


46
N
(Joins sheet 37)
(Joins sheet 45)
(Joins sheet 47)
1 Mile
5000 Feet
Scale 1:20000
NOXEN
FRANKSTOWN
SURBER MOUNTAIN
NORTH MOUNTAIN
Stone Mountain
Noxen
Windfall Run
Bowman Creek
Surber Run
Broad Hollow Run
Bowman Run
Beaver Run
The Stack
LUZERNE COUNTY


47
N
(Joins sheet 38)
(Joins sheet 46)
(Joins sheet 48)
Noxen
Beaumont
Ruggles
Beaver Run
Bowman Creek
South Run
Leonard Creek
Grassy Ridge
Beechnut Ridge
Hickory Knob
Galkus Pond
water
N O X E N
M O N R O E
LUZERNE COUNTY
1 Mile
5000 Feet
Scale 1:20000

48

N

1 Mile
5000 Feet

Scale 1:20000

(Joins sheet 47)

(Joins sheet 39)

(Joins sheet 49)

MONROE

NORTH MORELAND

Center Moreland

Lake Catalpa

LUZERNE COUNTY

OYE

WcD ReA

480 000 FEET

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 49

50

N

Scale 1:20000

1 Mile 5000 Feet

NEWTON

Shaffers Corners

Gardner Creek

Millwaukee

St Johns

DYE Creek

Run

ST GEORGES CEMETERY

EXTENSION

TURNPIKE

PENNSYLVANIA

Acorn Heights

TAYLOR

OLD FORGE

RANSOM

water

SUSQUEHANNA RIVER

LUZERNE COUNTY

Falling Spring Reservoir

(Joins sheet 41)

(Joins sheet 49)

(Joins sheet 54)

(Joins sheet 51)

(Joins sheet 42)

(Joins sheet 50)

(Joins sheet 52)

(Joins sheet 55)

SCRANTON
(county seat)

DUNMORE

Hyde Park

Taylor

Minooka

Lake Scranton

ROARING BROOK

Mountain Lake

Nay Aug Park

Robinson Park

CONRAIL

LACKAWANNA RIVER

Roaring Brook

Meadow Brook

Keyser Valley Creek

Leggetts Creek

CATHEDRAL CEMETERY

WASHBURN STREET CEMETERY

STRATFORD CEMETERY

State Hospital

DELAWARE AND HUDSON

N

1 Mile

5000 Feet

Scale 1:20000

52

N

(Joins sheet 43)

DUNMORE

THROOP

JEFFERSON

Dunmore Reservoir No 1

Dunmore Reservoir No 3

Dunmore Reservoir No 4

Reservoir No 7

Little Roaring Brook

ROARING BROOK

Silver Lake

Dam No 2

CONRAIL

Bottom Creek

R O A R I N G B R O O K T O W N S H I P

(Joins sheet 51)

(Joins sheet 53)

(Joins sheet 56)

Scale 1:20000

1 Mile

5000 Feet


53
N
(Joins sheet 44)
(Joins sheet 52)
(Joins sheet 57)
JEFFERSON
MADISON
ROARING BROOK
WAYNE COUNTY
Mount Cobb
Saco
Pindale
Wimmers
Drinker
Mud Pond
Curtis Reservoir
West Branch
Rock Bottom Creek
CONRAIL
water
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 54

(Joins sheet 51)

55

N

Greenwood
Minooka
Lackawanna
SCRANTON
(county seat)
Oak Hill
OLD FORGE
Rocky Glen Pond
Stafford Meadow Brook
District No 5 Reservoir
Stark Reservoir
Salem Village
LUZERNE COUNTY
ROARING BROOK
MOOSIC MOUNTAINS
SPRING BROOK
Green Run
Spring Brook
ST JOSEPHS CEMETERY
CONRAIL
PENNSYLVANIA TURNPIKE NORTHEAST EXTENSION
LCE

(Joins sheet 54)

(Joins sheet 56)

(Joins sheet 58)

1 Mile
5000 Feet
Scale 1:20000

56

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 52)

(Joins sheet 55)

(Joins sheet 57)

(Joins sheet 59)

SCRANTON

ELMHURST

MADISON

COVINGTON

SPRINGBROOK

MOOSIC MOUNTAINS

Elmhurst Reservoir

ROARING BROOK

Stalker Meadow Brook

Green Ridge

Hazard Pond

St Marys Lake

Bear Swamp

Mullen Swamp

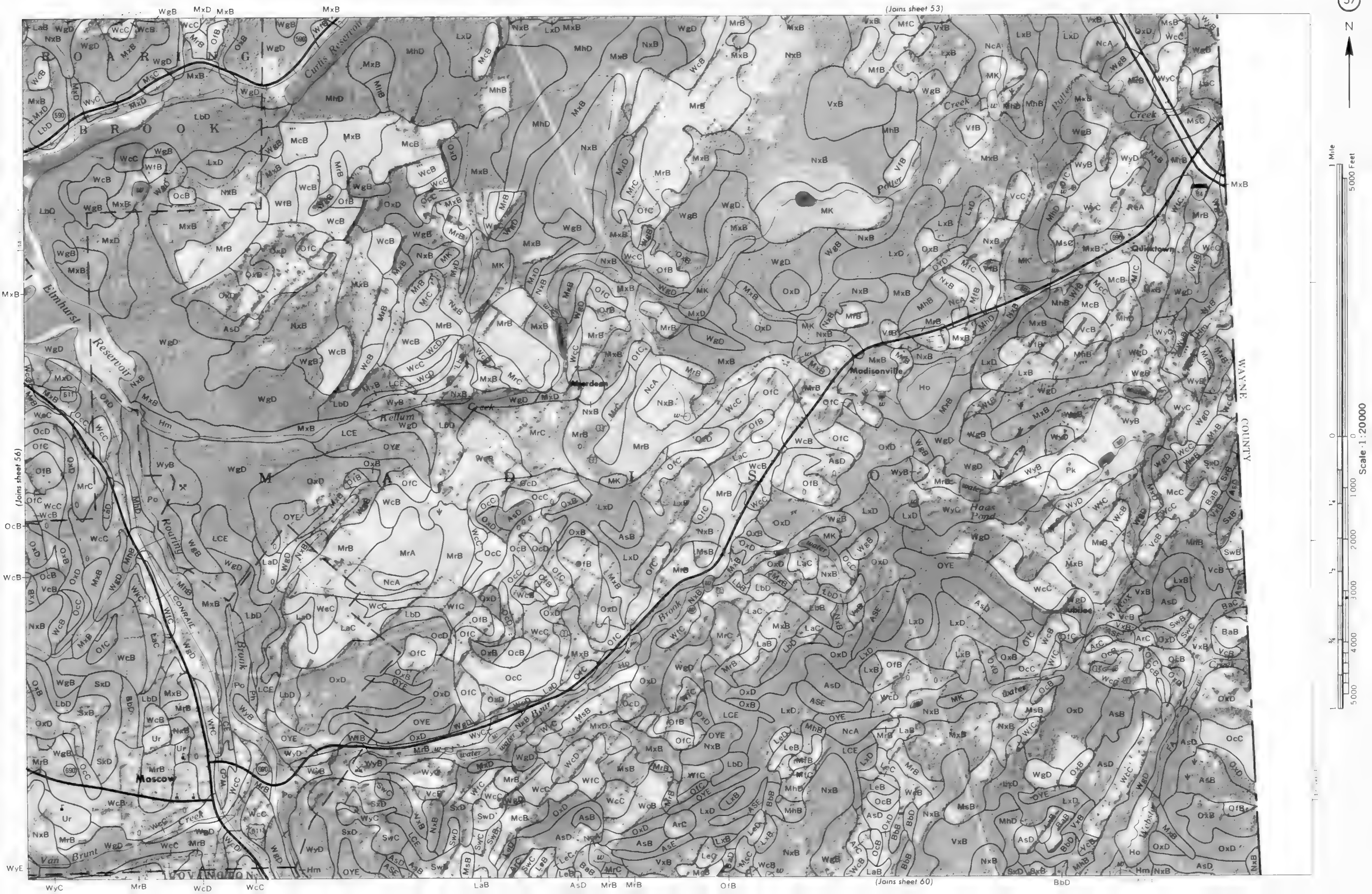
Tooley Corners

FAIRVIEW MEMORIAL ESTATE CEMETERY

Elmhurst

Conrail

water


(Joins sheet 53)
(Joins sheet 56)
(Joins sheet 60)
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
WAYNE COUNTY
ROARING BROOK
MADISON
COVINGTON
Curtis Reservoir
Elmhurst Reservoir
Kellum Creek
Roaring Brook
Van Brunt Creek
Brook
Potter Creek
Haas Pond
Moscow
Madisonville
Aberdeen
Jubilee
Quicktown
CONRAIL
water

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 58

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 59

59

N

Scale 1:20000

1 Mile

5000 Feet

Maple Lake

Quinlan Corners

COVINGTON

Union Mill Swamp

Lawagan Creek

Rattlesnake

Benjamin Pond

Spring Brook

Spring Brook Corners

Waires Reservoir

Rockdale

Springs

Yostville

Fells Corners

Brook

Spring

(Joins sheet 56)

(Joins sheet 58)

(Joins sheet 60)

(Joins sheet 62)


N
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 63)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
Bloomington
MADISON
Hollisters
Tannersville
Daleville
Falls Corners
COVINGTON
Freytown
WAYNE COUNTY
Langan Swamp
Roaring Brook
East Branch
Emerson Run
Lake Run
water
435
502
380
Conrail

N

(Joins sheet 58)

(Joins sheet 62)

(Joins sheet 64)

LUZERNE COUNTY

P R I N G B R O O K

L E H I G H

Creek

Water

1 Mile 5,000 Feet

Scale 1:20000

N

Scale 1:20000

1 Mile 5000 Feet

0 0 1000 2000 3000 4000 5000

(Joins sheet 61)

(Joins sheet 59)

(Joins sheet 63)

(Joins sheet 65)

Wallres Reservoir

Spring

Hm Brook

Boar Hole

Panther Hill

The Hogback

Ash Creek

Blair Hill

Lake Champagne

SPRINGBROOK

CLIFTON

LEHIGH

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 63

63

N

(Joins sheet 60)

(Joins sheet 62)

(Joins inset, sheet 66)

2 610 000 FEET

2 630 000 FEET

1 415 000 FEET

Henry Lake

Wildcat Swamp

English Swamp

Tamarack Lake

Johnson Pond

Westend Pond

Upper Klondike Pond

Lower Klondike Pond

Wildcat Creek

Tamarack Creek

Lehigh

CONRAIL

COVINGTON

CLIFTON

WAYNE COUNTY

1 Mile

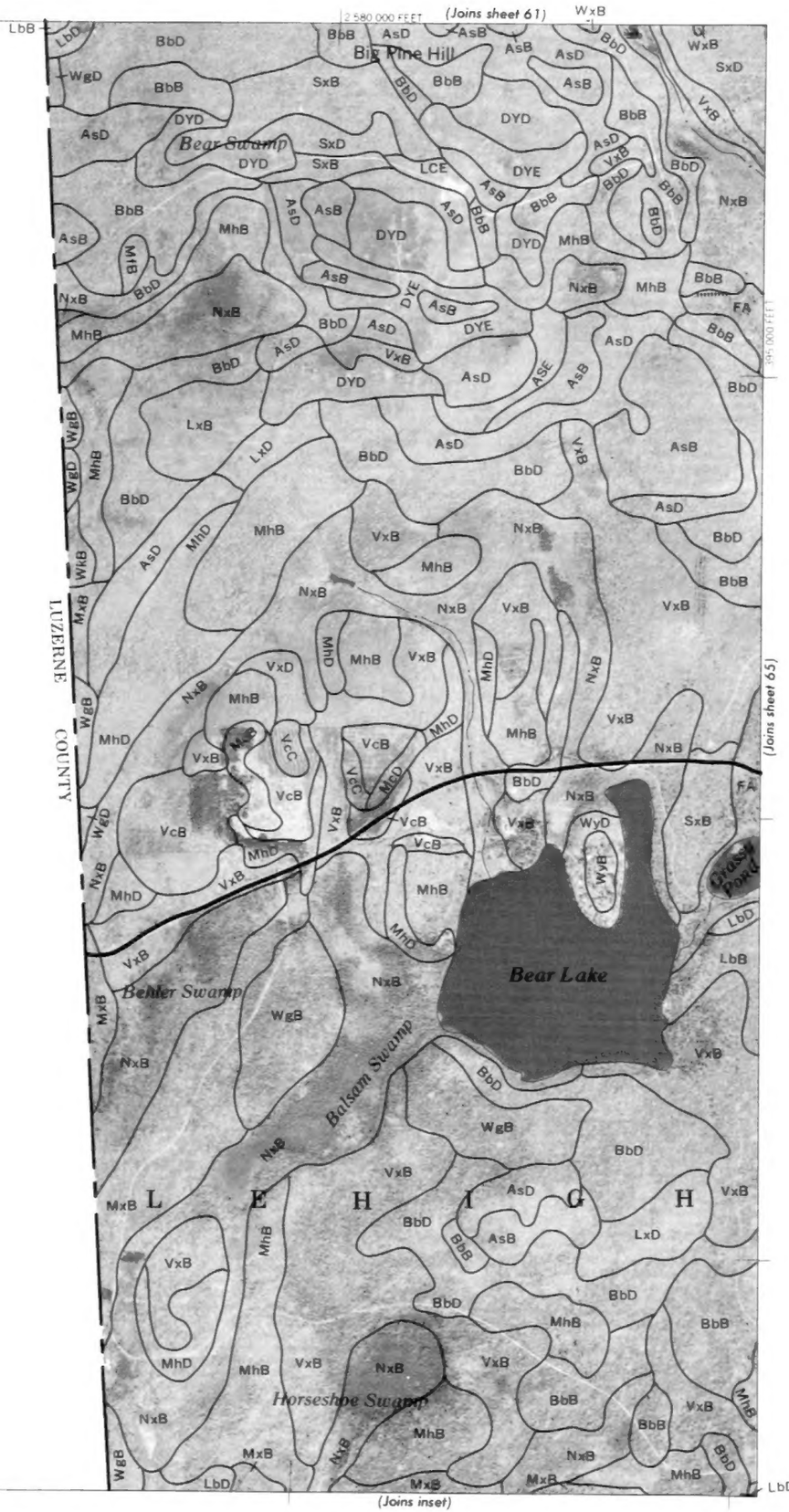
5000 Feet

Scale · 1 : 20000

N

Scale · 1 : 20000

1 Mile 5000 Feet



2 565 000 FEET

(Joins sheet 64)
(Joins sheet 62)
(Joins inset, sheet 66)
(Joins sheet 66)

2 585 000 FEET
2 610 000 FEET

65

N

1 Mile
5000 Feet

Scale 1:20000

MONROE COUNTY

CLIFTON TOWNSHIP

LEHIGH

Spring Run
Hager Run
Buckley Run
Spruce Run
Mill Run
Ash Run
Tanner Run
Slater Creek
Grassy Pond
Pond
Water
Clifton

LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA — SHEET NUMBER 66

N

Scale 1:20000

1 Mile 5000 Feet 0 0 1000 2000 3000 4000 5000

(Joins sheet 65)

(Joins inset, sheet 64)

(Joins sheet 63)

(Joins sheet 65)

2 610 000 FEET

380 000 FEET

2 620 000 FEET

370 000 FEET

2 615 000 FEET

2 590 000 FEET

C L I F T O N

E L H I G H

Sand Spring Butler Berry Creek Thornhurst Pond Creek Ruck Run

LUZERNE COUNTY

MONROE COUNTY

WAYNE COUNTY

LEHIGH RIVER